

The Effects of a Social-Evaluative Body Image Threat on Shame, Social Physique Anxiety,
Body Dissatisfaction and Cortisol Responses in University Men

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Submitted in partial fulfillment of the requirements for the degree of
Master of Science in Applied Health Sciences
(Kinesiology)

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Dedication

I would like to dedicate this thesis to my parents Daniel and Wendy and my husband Mark whom have always supported and encouraged me to follow my dreams. Without their encouragement and guidance I would not be where I am today.

Abstract

Men struggle with body image concerns particularly related to the desire to be muscular. In women, social-evaluative body image threats have been linked to increased shame and cortisol responses, consistent with social self-preservation theory (SSPT), but no research has investigated these responses in men. Men ($n = 66$) were randomly assigned to either a social-evaluative threat (SET) or non-social-evaluative threat (N-SET) condition. Participants provided saliva samples and completed body shame, body dissatisfaction and social physique anxiety measures prior to and following their condition, during which anthropometric and strength measures were assessed. Results indicated men in the SET condition had higher body shame, social physique anxiety, and body dissatisfaction and had higher levels of cortisol than men in the N-SET condition post-social-evaluative threat. These findings, consistent with SSPT, suggest that social-evaluative body image threats may lead to increased body shame and social physique anxiety, greater body dissatisfaction and higher cortisol levels.

Acknowledgments

I wish to thank, first and foremost my supervisor Dr. Kimberley Gammage to whom I owe my deepest gratitude. Without her guidance this thesis would not have been possible. I cannot thank you enough for giving me the opportunity to learn and grow in ways I never thought possible. I would also like to thank my committee members Drs. Larkin Lamarche and Cameron Muir for their guidance and support throughout this process. Dr. Lamarche, I cannot express how grateful I am to have had the opportunity to work with you. Your advice and patience kept me sane in times of overwhelming stress. Dr. Muir, thank you for providing me with continued support and always allowing me to ask questions and seek advice. I would also like to thank my two confederates Josh and Katrina and research assistant Ryan for all their hard work and dedication. You all spend countless hours in the lab with me and I truly appreciate everything you did to ensure the success of this project. Finally, I would like to thank all my colleagues. Each and every one of you have help me throughout this process in more ways you could image and I will forever be grateful for this opportunity to have work along side all of you. Best of luck to everyone.

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CHAPTER 1: LITERATURE REVIEW

1.1. Definition & Background Information

Body image can be defined as an individual's thoughts, feelings and behaviours in relation to their physical appearance and their overall functionality, including strength and coordination, when compared to an ideal (Brown, Cash, & Mikulka, 1990; Cash, 1994; Cash, 2004; Cash & Henry, 1995). Body image is a construct that encompasses an individual's self-perceptions and self-attitudes (e.g., investment and importance placed on appearance; Cash & Pruzinsky, 2002; Cash, Morrow, Hrabosky, & Perry, 2004) about his/her body.

1.2. Dimensions of Body Image

Body image perceptions have been referred to as an individual's thoughts and beliefs about his/her outer self or physical appearance including body shape and size. Specifically, the perceptual component reflects the accuracy of an individual's body size estimation of him/herself (Cash & Green, 1986).

The attitudinal dimension of body image relates to individuals' overall assessment of their appearance with regard to body weight, shape, muscularity and other specific physical characteristics (Cash, Melnyk, & Hrabosky, 2004). There are three elements that make up this dimension of body image: behavioural, affective and cognitive (Cash & Pruzinsky, 2002). The behavioural aspect of body image reflects the level of importance an individual places on body size and shape. Body image behaviours can include dieting, exercise, strength training and other activities designed to alter body size, shape, muscularity, as well as the use of clothing, make-up and avoidance behaviours (Cash & Pruzinsky, 2002; Muth & Cash, 1997).

Body image affect has been referred to as experiences of discrete body image emotions (Muth & Cash, 1997). It includes emotional responses individuals experience in relation to their appearance including disappointment, hopelessness, anxiety, shame and/or frustration (Szymanski & Cash, 1995). It may also include positive emotions such as pride, esteem, or appreciation for the body.

The cognitive element of body image includes beliefs individuals hold about their bodies including level of fatness, shape, muscularity and body functionality. The cognitive element can be broken down into two elements: evaluation and investment (Banfield & McCabe, 2002; Cash & Pruzinsky, 2002). Evaluation body image refers to how an individual appraises his/her body in terms of beliefs about appearance, ranging from positive to negative (e.g., body satisfaction or body dissatisfaction; Cash & Pruzinsky, 2002; Muth & Cash, 1997). Evaluation can occur for the body as a whole or can be based on specific features of an individual's body, such as well-defined abdominals or muscular chest and arms, and can be influenced by an emotional assessment of the physical self. The investment element of the cognitive dimension, coinciding with behavioural investment, refers to the level of importance placed on appearance and how motivated individuals are in managing their "looks" (e.g., constantly thinking about diet, exercise, and/or cosmetic surgery; Abbott & Barber, 2010; Cash & Pruzinsky, 2002; Muth & Cash, 1997). A strong appearance schema (i.e., high investment) has been found to potentially encourage body appearance dysfunction and lead to dysphoric body image thoughts or feelings (Muth & Cash, 1997). Self-assessment, value and/or appearance investment may individually or combined influence

an individual's body satisfaction and ultimately his/her attitudinal behaviours (Cash & Pruzinsky, 2002; Pope, Olivardia, Gruber, & Borowiecki, 1998).

1.3. Female Body Image

Women have been the major focus of research on body image concerns, showing significant levels of body dissatisfaction with an overwhelming focus on the thin ideal (Algars et al., 2009; Hart, Leary, & Rejeski, 1989; Murnen, 2011; Wertheim & Paxton, 2011). Compared to men, women tend to be more dissatisfied with their overall bodies and focus on intentional weight loss, engaging in appearance enhancing behaviours, such as dieting and extreme exercise, which can be dangerous and cause for concern (Cash & Pruzinsky, 2002).

1.4. Male Body Image

Although women remain the focus of most body image research, over the past 20 years researchers have recognized that negative body image is not just a concern for women, but for men as well. For men body image concerns take on a different form, due in large part to the gender difference in ideals. This current social standard for men of broad shoulders, a narrow waist, and well-defined abdominals forming a “V-shape” figure drives men towards desiring a lean and muscular body (Cash & Pruzinsky, 2002; Pope et al., 1998). McFarland and Petrie (2012) found men generally place more value on a lean, muscular, V-shaped upper torso with well-defined, proportioned legs, rather than their overall feeling of fat or muscularity.

Evidence of this ideal is reflected in changing media images. Since the 1970s the male ideal has become more muscular, visible in the once scrawny GI Joe figurine, now “buff” toned and muscular. Since 1964 GI Joe has gone through many changes from 11 ½

inches tall down to 3 $\frac{3}{4}$ inches and back to the original 11 $\frac{1}{2}$ inch figure in 1991 (Pope et al., 1998). However, the main change has been in his muscularity. GI Joe has developed increasingly sharp muscular definition, going from no abdominal muscles to rippled abdominals, reflecting those of an advanced body builder. If today's GI Joe was to be extrapolated to real life he would stand 70 inches in height and his biceps would be larger than any bodybuilder in history (Pope et al., 1998). Given this extreme depiction of the ideal, it is not surprising that men also experience dissatisfaction with their bodies, particularly with their muscularity. Approximately one-third of men report wanting to be more muscular, with the fear of being too small or too thin as the driving force (Algars et al., 2009; Cash & Pruzinsky, 2002).

Current media messages may contribute to men viewing themselves as small, skinny, weak and not muscular, even though in reality they may be the opposite (Cash & Pruzinsky, 2002). A study done by Agliata and Tantleff-Dunn (2004) found that college men between 17 and 27 years of age who were exposed to images of an ideal male body (lean and muscular) in advertisements had significantly higher levels of muscle dissatisfaction than those exposed to neutral advertisements. Men exposed to ideal male images also became significantly more depressed and had higher levels of muscular dissatisfaction. The opposite occurred for those men shown neutral media messages; in fact there were significant decreases in depression in these men. Other research done in the area of body image and the media has found similar results indicating the ideal of beauty, specifically muscularity, is difficult to achieve, and shaped by social context; further, mass media messaging has been found to increase body dissatisfaction in men

(Agliata & Tantleff-Dunn, 2004; Arbour & Martin Ginis, 2006; Derenne & Beresin, 2006).

1.5. Drive for Muscularity

With increasing rates of body dissatisfaction in men (Garner, 1997), appearance may be a significant issue for a large number of men. Given the rise in awareness of male body image concerns, recent work has focused on one specific aspect of male body image termed *the drive for muscularity* (Cash & Pruzinsky, 2002; Cash & Smolak, 2011; McCreary & Sasse, 2000). Drive for muscularity refers specifically to a desire to be bigger and more muscular, and was conceptualized initially by McCreary and Sasse (2000). They suggested boys and men do not tend to experience eating disorders (e.g., anorexia or bulimia) to the same extent as girls and women, likely because they are more focused on achieving increased physical bulk and a muscular appearance. Researchers have found supplement use, exercise dependence, depression, and low self-esteem are all related to a higher drive for muscularity (Chittester & Hausenblas, 2009). Further, there are stronger correlations between these negative outcomes and drive for muscularity in men than women (McCreary & Sasse, 2000; McCreary, Dorsch, & Rennebohm, 2001).

Research has also examined cognitive and affective outcomes associated with the drive for muscularity. A high drive for muscularity has been found to be associated with lower levels of self-esteem and higher levels of depression in adolescent boys, as well as greater body image dissatisfaction, social physique anxiety (SPA), and poorer self-efficacy (McCreary & Sasse, 2000). Drive for muscularity has also been associated with anxiety, perfectionistic tendencies and a heavy focus on physical appearance and bodily fitness (Davis, Karvinen, & McCreary, 2005). In today's society confirming to the

Western ideal of muscularity is an important aspect of oneself (i.e., depression) as well as the social self and being accepted in society (Baumeister & Tice, 1990; Cash, Santos, & Williams, 2005; Ricciardelli & McCabe, 2011). Although drive for muscularity has been one of the main constructs explored in relation to male body image, others have also been investigated including SPA, body dissatisfaction and to a lesser extent shame (Castonguay, Sabiston, Crocker, & Mack, 2014; Kruisselbrink, Dodge, Swanburg, & MacLeod, 2004; Tylka, Bergeron, & Schwartz, 2005). These other body image concerns however, are often related to drive for muscularity.

1.6. Body Shame

Recently, some research has examined the experience of body shame in men. Body shame is defined as an acutely painful emotional experience that occur when an individual fail to meet internalized social standards with a focus on uncontrollable, self-rooted cause (“I am an ugly person”; Castonguay et al., 2013). Shame is considered part of the family of self-conscious emotions. Self-conscious emotions require self-awareness and self-representation, whereas non-self-conscious or basic emotions (e.g., anger) do not (Lewis, Sullivan, Stanger, & Weiss, 1989; Tracy & Robins, 2004). Further, self-conscious emotions are generally experienced when individuals become aware that they have failed to live up to (or lived up to) an actual or ideal self-representation (Tracy & Robins, 2004), such as the Western ideal for the male body.

Much of the research has examined body shame within the context of self-objectification theory (Daniel & Bridges, 2013; Noll & Fredrickson, 2006). Martins, Tiggemann and Kirkbride (2007) explored trait and state differences in self-objectification and body image, including body shame, as a two-part study in a sample of

hetero- and homosexual men. The authors found homosexual men scored higher on self-objectification, body shame, and body dissatisfaction with similar results found following the manipulation of state self-objectification in the second study, compared to heterosexual men. However, drive for muscularity was not found to be significantly different between the men suggesting muscularity may be a shared concern for hetero- and homosexual men.

An exploratory study conducted by Daniel and Bridges (2013) examined the relative impact of body image variables (e.g., body shame and body surveillance) and masculinity on the prediction of sexual satisfaction. They found, consistent with objectification theory, a positive mediating role of body surveillance between men's internalization of media ideals and body shame. Specifically, the authors identified masculinity as the only significant predictor of sexual satisfaction concluding the role of body image and masculinity in men should be further explored.

Castonguay et al. (2014) recently developed and validated the body and appearance self-conscious emotions scale (BASES). They found in samples of adult and adolescent men and women that body shame was positively related to depression and negative affect, which have also been found to be related in individuals with a higher body mass index (BMI; Pasco, Williams, Jacka, Brennan, & Berk, 2013). Body shame was also positively correlated with SPA, body image concerns and body image importance. Body shame was also found to be negatively related to self-esteem and physical self-perceptions of appearance (Castonguay et al., 2014).

1.7. Social Physique Anxiety.

Social physique anxiety is defined as situational concern or distress associated with the perceived evaluation of one's physical appearance (Frederick & Morrison, 1996; Kruisselbrink et al., 2004). In investigating the experience of situation-specific SPA, Kruisselbrink et al. (2004) examined state-SPA in men and women in three different exercise environments (all-male, mixed-sex, all female), using a scenario protocol. They had male and female participants imagine there were going to an exercise facility wearing their usual exercise attire however, when participants looked around they would notice everyone in the room was: (a) all female, (b) all male, or (c) mix of females and males. In women, the presence of men in exercise settings was associated with increases in SPA, whereas all-female settings were associated with the lowest SPA. However, no differences in SPA were found between the three settings in men.

Carron and Prapavessis (1997) also used a scenario protocol to investigate social physique anxiety in men and women. Participants were asked to describe social conditions (e.g., alone, with a best friend or with a group of friends) and in anxiety provoking situations provided by the participants themselves. They found SPA was higher when alone in a social condition than when with a group of friends or in the company of a best friend. It should be noted that in this study, men's and women's responses were collapsed, and it is unclear if there were any gender differences.

Marquez and McAuley (2001) found similar results when participants (males and females) were presented with three scenarios. In the first participants were asked to indicate what scenario would most likely make them feel self-conscious, anxious, or embarrassed about their physique. The second scenario asked participants to choose one of four situations (males: swimsuit at a beach or pool, around attractive females, not

wearing clothing, around more attractive males working out; female: swimsuit at beach or pool, around more attractive females, attending formal event, wearing revealing/tight clothing working out) that would make them feel least self-conscious, anxious, or embarrassed about their bodies. Finally, participants were asked to image themselves exercising in the presence of others. Participants were asked to image themselves in the identified situation at that moment. Results showed females who were part of a high physical evaluation or threat condition (at exercise facility or wearing a bathing suit) reported the highest levels of state SPA. However, participants in the high physical evaluation/threat condition reported in the highest levels of state anxiety compared to the low physical evaluation/threat condition regardless of gender.

1.8. Body Dissatisfaction.

While men's body image and the ideal tend to be focused on muscularity, body dissatisfaction can be related to other factors. Body dissatisfaction is defined as having lower satisfaction with one's body and greater body image concerns (Garner, 1991). It is part of the evaluative component of the body image attitudes construct and relates to disappointment or unease with physical attributes as well as thoughts and beliefs about appearance (Muth & Cash, 1997). For women, dissatisfaction almost always relates to the desire to be thinner whereas for men, it can relate to the desire to be smaller or bigger (Siberstein, Striegel-Moore, Timko, & Rodin, 1988). Tylka et al. (2005) examined male body attitudes and determined three main dimensions of the body that men tend to be dissatisfied with: height, low body fat and muscularity. By contrast, women's dissatisfaction tends to focus on weight and shape (Algars et al., 2009; Hart et al., 1989).

Several studies have examined body image concerns after playing video games or viewing media images of muscular males to determine their effects on body dissatisfaction in men. Video games in which a muscular male character was used were associated with more negative body image in men, accompanied by decreases in positive feeling towards their bodies, general body esteem and positive attitudes towards muscularity (Barlett & Harris, 2008). Similarly men exposed to television advertisements containing an ideal male became significantly more depressed and had higher levels of muscle dissatisfaction than men who viewed neutral advertisements (Aglia, 2004).

1.9. Theoretical Framework: Social Self Preservation Theory (SSPT)

Humans are social animals for whom the basic needs of acceptance and belonging are fundamental motivations (Baumeister & Leary, 1995; James, 1952). Individuals concern themselves with achieving or maintaining a positive social self, thought to be a primary human goal (Gruenewald, Kemeny, Aziz, & Fahey, 2004). This goal influences individuals to act a certain way and present themselves according to societal standards in order to avoid being rejected or excluded by others. Threats to the social self have been found to devalue individuals, including their abilities, traits, social image or esteem (Gruenewald et al., 2004). These threats have the potential to result in rejection from the group, damage one's identity and ultimately judgment of an individual as unworthy of acceptance (Dickerson & Kemeny, 2004; Gruenewald et al., 2004). These threats have been termed *social-evaluative threats*, in which individuals feel as they are potentially the target of negative judgment from others (Gruenewald et al., 2004). Further, these negative evaluations have the potential to lead to the loss of social standing, acceptance, or social-esteem (Dickerson & Kemeny, 2004; Gruenewald et al., 2004).

According to SSPT, when faced with social-evaluative threats, there is a set of psychobiological responses that are elicited to act as a signal, warning of the potential loss of social status (Dickerson, Gruenewald, & Kemeny, 2004; Dickerson, Kemeny, Aziz, Kim, & Fahey, 2004). Several physiological responses have been identified, with cortisol being the most studied (Dickerson & Kemeny, 2004; Gruenewald et al., 2004; Martin Ginis, Strong, Arent, & Bray, 2012; Rohleder, Schommer, Hellhammer, Engel, & Kirschbaum, 2001). In addition, inflammatory responses (e.g., cytokine activity; Bosch et al., 2009; Dickerson, 2008; Dickerson, Gable, Irwin, Aziz, & Kemeny, 2009; Dickerson, Gruenewald et al., 2004; Dickerson, Gruenewald, & Kemeny, 2009; Dickerson & Kemeny, 2004; Dickerson, Mycek, & Zaldivar, 2008; Gruenewald et al., 2004; Jönsson et al., 2010; Kirschbaum, Pirke, & Hellhammer, 1993; Wadiwalla et al., 2010) and cardiovascular responses (i.e., blood pressure; Spalding, Lyon, Steel, & Hatfield, 2004) have also been investigated.

According to research using SSPT the main psychological responses that occur in response to a social-evaluative threat are negative self-conscious emotions (shame, guilt and embarrassment; Dickerson, Gruenewald et al., 2004; Kemeny, Gruenewald, & Dickerson, 2004; Lamarche, Kerr, Faulkner, Gammage, & Klentrou, 2012; Rohleder, Beilen, Chen, Wolf, & Kirschbaum, 2007), with shame being the key emotional response. Shame has been found to be more responsive to social-evaluative threats over other non-self-conscious or primary emotions (e.g., anger, fear, sadness; Dickerson, 2008; Dickerson et al., 2008; Dickerson, Gruenewald et al., 2004; Dickerson, Kemeny et al., 2004; Leary, Haupt, Strausser, & Chokel, 1998; Leary, Tambor, Terdal, & Downs, 1995) as well as positive self-conscious emotions (pride; Tangney, 1999).

1.9.1. Cortisol. Cortisol is an important hormone generally released in response to stress. It plays a critical role in the regulation of many physiological responses during psychological or physical stressors, stimulating a fight-or-flight response (Dickerson, Gruenwald et al., 2004; Dickerson & Kemeny, 2004; Rohleder, Chen, Wolf, & Miller, 2008; Walker et al., 1998). Across the literature several studies have shown that different types of stressors, but particularly those related to negative judgments regarding performance (i.e., social-evaluative threats), can lead to a significant increase in cortisol levels (Dickerson, Gruenwald et al., 2004; Dickerson & Kemeny, 2004; Rohleder et al., 2007).

Because cortisol has been found to play a crucial role when it comes to metabolism, negative biological and health implications can occur if levels remain too high or if the cortisol response fails to turn off upon the termination of a threat (Dickerson & Kemeny, 2004). A normal cortisol response (in which levels increase during a stressor and return to normal after the stressor is over) is important; however, in prolonged elevated conditions, there is the potential for negative physiological responses such as induced vasoconstriction and increased heart rate. If cortisol elevation remains high, or a stressor is continually present, the excess cortisol has been linked to many negative biological and health effects including suppressed immunity, hypertension, insulin resistance, glucose intolerance and other health concerns (Dickerson & Kemeny, 2004; Rohleder et al., 2008; Walker et al., 1998).

1.9.2. Shame. Shame, the key psychological response to social-evaluative threats according to SSPT, is a self-conscious emotional response to an event where one's social worth or one's social status is threatened (Dickerson & Kemeny, 2004; Gruenewald et al.,

2004). Self-conscious emotions differ from primary emotions (e.g., fear, anger). Self-conscious emotions are a family of emotions that require self-reflection and self-evaluation. Self-conscious emotions such as shame, guilt, and embarrassment usually occur from failure or personal transgressions (Dickerson, Kemeny et al., 2004).

While several self-conscious emotions have been identified (e.g., shame, guilt, embarrassment, pride), researchers have found distinguishing characteristics for each emotion. While pride is a positive emotion, shame, embarrassment, and guilt are all negative in nature. Self-conscious emotions are more likely to occur in public (versus private) situations, although they can also occur when alone (Tangney, Miller, Flicker, & Berlow, 1996). One of the key differences between shame and guilt seems to be that in shame, the self is the object of negative evaluation (e.g., I am a bad person) while in guilt, the behaviour is evaluated negatively (e.g., that was a bad thing to do; Lewis, 1971; Niedenthal, Tangney, & Gavanski, 1994). Shame is also generally considered to be a more intense and dysphoric feeling than guilt. It is also associated with an increase in cortisol leading to physiological responses (e.g., increased heart rate, blushing; Dickerson & Kemeny, 2004; Tangney et al., 1996). Experiences of shame are associated with feeling isolated and inferior; people feeling shame report feeling physically smaller (Tangney et al., 1996). Shame has also been associated with wanting to hide and trying to avoid admitting failures or transgressions (Tangney et al., 1996). Embarrassment, another self-conscious emotion, is less intense than shame and is associated with more situational transgressions. It is generally a temporary emotion when compared to shame and leads to less negative feelings about oneself (Tangney et al., 1996).

According to SSPT, people monitor the environment for threats to their social status (Dickerson et al., 2009; Gruenewald, Dickerson, & Kemeny, 2007). When a social-evaluative threat is encountered, physiological and psychological responses (i.e., shame and cortisol) are elicited (Dickerson et al., 2004; Dickerson & Kemeny, 2004). These physiological and psychological responses are coordinated, and are thought to support strategies designed to protect the social self and reduce the risk of further loss of social status (Dickerson, Gruenewald et al., 2004). These strategies include avoidance, appeasement, withdrawal, or disengagement (Dickerson, Gruenewald et al., 2009; Gruenewald et al., 2007). Much research has supported the tenets of SSPT. The majority of this work has tested the theory using a specific social-evaluative threat, the Trier Social Stress Test (TSST).

1.10. The Trier Social Stress Test (TSST).

The Trier Social Stress Test (TSST) was developed by Kirschbaum et al. (1993) as a general paradigm for testing psychobiological responses to acute stressors in laboratory settings. The procedure includes an initial anticipation period of 10 minutes where participants are given instructions to prepare a 5-minute free speech as if they were introducing themselves to the judges trying to convince them that they are a good applicant for a job. They are told this will be followed by 5 minutes of different arithmetic questions. Next, participants are taken into a room with three people (judges), a video camera and a tape recorder. Participants are told they will stand in front of the microphone to give their 5-minute speech and answer the arithmetic problems. The participants are told that video and voice analysis will also be conducted. Then physiological samples (i.e., saliva) are collected after a rest period. A control condition is

used, involving either another quiet rest period instead of delivering the speech and doing the math problems, or leaving the participant to complete the same tasks (i.e., speech, math test) in the absence of judges, a video camera and microphone.

The TSST has been used in many studies examining social-evaluative threats using SSPT (e.g., Gruenewald et al., 2004; Kemeny et al., 2004) to examine physiological and psychological responses to social-evaluative threats, and characteristics of the threats that elicit these responses. These procedures generally find an increase in cortisol following the social-evaluative threat, with no significant increase in cortisol after the control condition (i.e., quiet rest or non-social-evaluative threat). Self-conscious emotions, particularly shame, are also reported following social-evaluative threats compared to non-social-evaluative threats (Gruenewald et al., 2004; Kemeny et al., 2004; Kirschbaum et al., 1993). By contrast, primary emotions (such as anger) generally show no changes following a social-evaluative threat (Dickerson et al., 2008; Leary et al., 1998).

1.11. Conditions That Increase Psychobiological Responses.

There are several characteristics of social-evaluative threats that can make them particularly threatening, leading to greater psychobiological (shame and/or cortisol) responses and slower recovery. Dickerson and Kemeny (2004) summarized these characteristics in their meta-analysis investigating cortisol responses to and recovery from acute stressors. They found that social-evaluative (e.g., judgment from others) stressors yielded stronger effects than other types of stressors (e.g., motivated performance, such as winning a prize). Social-evaluative threats were particularly threatening when they could affect an individual's central goal, or if the evaluation was

based on an attribute or skill that is highly valued (Dickerson & Kemeny, 2004; Rohleder et al., 2007). Further, situations that were uncontrollable (i.e., when a person's behaviour cannot affect the outcome) also heightened the response (Dickerson & Kemeny, 2004). Dickerson and Kemeny (2004) also reported that negative social comparisons and permanent recordings (e.g., video) increased the response, and that combining two or more of these elements increased the cortisol response further.

Gruenewald et al. (2004) used a combination of the four characteristics of social-evaluative threats that have been found to increase psychobiological responses (i.e., a social evaluation, evaluation of a central goal or characteristic of importance, uncontrollability, and a permanent record) to investigate psychobiological responses to social-evaluative threats. Participants were randomly assigned to complete both a speech and difficult math problems either in the presence of an unfriendly evaluative audience (social-evaluative condition) or in a private setting (non-evaluative condition) as a modification of the TSST. The results showed, consistent with SSPT, a significant condition-by-time interaction for shame, social self-esteem, heart rate, blood pressure, and cortisol (Gruenewald et al., 2004). Further, there were no interactions for anxiety or performance self-esteem (both non-self-conscious responses). Also, participants who reported greater increases in shame and greater decreases in social self-esteem also showed greater increases in cortisol. These results are consistent with other research. A review by Kemeny et al. (2004) described results from a meta-analysis (Dickerson & Kemeny, 2004) showing an increased cortisol response in participants who experienced greater feelings of shame during social-evaluative performance; however, cortisol differences were not seen between the different performance groups (i.e., speech and

computerized math task; Dickerson & Kemeny, 2004). This adds to the research showing that cortisol responses are more predominant and reliable when uncontrollable threats to oneself occur during an observed performance (i.e., social-evaluative threat), especially when shame is an emotional response (Dickerson, Gruenewald et al., 2004; Gruenewald et al., 2004). The majority of research investigating psychobiological responses to social-evaluative threats has used the TSST as the stressor (Dickerson & Kemeny, 2004; Leary et al., 1995) or has investigated other performance evaluations (e.g., ballroom dancing; Rohleder et al., 2007). However, it may also apply to other settings including evaluations of individual characteristics such as body image.

1.12. SSPT and Body Image

There are several reasons why SSPT may be particularly relevant for understanding body image. Firstly, body image is socially constructed, with friends, family, strangers, and the media all significant influences (McKinley, 2011; Ricciardelli & McCabe, 2011; Tiggemann, 2011). Secondly, physical appearance is an important aspect of social acceptance in Western society today. For example, Baumeister and Tice (1990) described three primary reasons why individuals are socially excluded. In addition to failing to contribute to the group and violating the group's norms or rules, they also suggested that physical unattractiveness is a primary reason individuals are socially excluded. Thus, individuals can lower the likelihood that they will be excluded by conforming to the group's standards; that is, meeting the Western ideal for physical appearance (Leary, 1990). For men in particular, the ideal in terms of physical appearance is muscularity, which is linked to masculinity (Grogan & Richards, 2002) and ultimately social status (McCreary, Saucier, & Courtenay, 2005). Further, in a qualitative

study with young adult men, being muscular was associated with social benefits, including being attractive to women, and was considered a sign of both social status and success to others (Morrison, Morrison, & Hopkins, 2003). Additionally, men reported that muscularity also creates respect and work-related success (Morrison et al., 2003).

Thirdly, much research examining body image concerns has indicated that situations in which there is an element of social evaluation (e.g., presence of others who can judge one's body) are particularly influential (Carron & Prapavessis, 1997; Lamarche, Ozimok, & Gammage, in progress). For example, Rhea, Landers, Alvar, and Arent (2003) found that men performing a one-repetition maximum bench press either in competition or with an audience lifted significantly more weight than they did during a co-action condition. They reported lifting more in front of the audience and in the competition settings may have been due to the awareness of being evaluated and recognizing that other subjects were lifting more than them, resulting in setting a new goal to improve. Participants also reported lifting more weight because of classmates watching; they may have been trying to avoid embarrassment in front of others and to appear competent.

One commonly studied aspect of body image is SPA, the concern that arises explicitly due to the body being evaluated by others (Hart et al., 1989). In men, SPA has been related to lower self-esteem, symptoms of muscle dysmorphia, and self-presentational motivated exercise (e.g., appearance; Grieve, Jackson, Reece, Marklin, & Delaney, 2008). Further, SPA has been positively correlated to the drive for muscularity (Duggan & McCreary, 2004; Martin, Kliber, Kulinna, & Fahlman, 2006; McCreary &

Saucier, 2009). Thus, explicit evaluation of the body (i.e., a social-evaluative threat) is a concern for men.

Finally, there is also some evidence that the way men cope with a body image threat is consistent with SSPT (Cash et al., 2005; Lamarche et al., in progress). For instance, Cash et al. (2005) reported that college students showed three primary strategies for coping with negative body image: avoidance, appearance fixing, and positive rationale acceptance. According to SSPT, avoidance/withdrawal is a common response to social-evaluative threats to avoid further loss of social status. Further, appearance fixing can be seen as a form of appeasement, whereby individuals attempt to change their appearance to be closer to the ideal, and reduce negative evaluations from others. Similar findings were shown by Lamarche et al. (in progress) in a qualitative study with college men. They found avoidance, withdrawal, and appearance fixing to be the most commonly reported strategies for coping with body image threats in men.

1.13. Application of SSPT to Body Image

To date, only five studies have explicitly used SSPT to aide in the understanding of body image. A qualitative study conducted by Lamarche et al. (2012) examined the potential applicability of SSPT to body image threats in college women to determine whether it can further our understanding of negative body image. Using a qualitative approach, twenty-three college women were interviewed about their perceptions of comfortable and uncomfortable body image situations and the context of those situations. The first of two themes identified as uncomfortable body image situations was the social environment, which included the presence of others, particularly an ideal individual, or someone who was perceived as more attractive, in better shape or thinner. The second

factor was described as body exposure, which women reported as situations involving revealing their bodies to others, especially men (e.g., wearing a bathing suit or during intimacy). Thus, for women the opportunity for social and self-evaluation contributed to greater body image concerns consistent with SSPT (Lamarche et al., 2012). Further, the responses to these uncomfortable situations reported by women were also consistent with SSPT. Specifically, women reported avoiding or leaving the threatening situation, and/or becoming involved in activities to change their body towards the ideal such as exercise or dieting. Lamarche et al. (2012) also found it was relatively easier for women to list uncomfortable situations regardless of level of SPA, compared to their ability to list comfortable body image situations.

The first study to experimentally test the applicability of SSPT to body image threats examined college women. Martin Ginis et al. (2012) conducted two laboratory studies looking at the cortisol response to social-evaluative body image threats. In the first study, female college students were led to believe that, while wearing revealing exercise clothing, they would be videotaped by a man while doing strength exercises in the school's public exercise facility. Participants in the control condition were told they would exercise in a private setting, alone while wearing baggy exercise attire (i.e., track suit). In the second experiment female college students in the experimental group were asked to try on revealing exercise attire in a mirrored changing area and assess the clothing fit. They were told that they would then come out of the change room so the researcher could assess the clothing fit and they could be videotaped by a male. They were informed the purpose of the videotape was so a panel of judges could evaluate them on how well the clothing fit. In the control condition, participants tried on the same

revealing exercise clothing in a private, mirrored change room, assessed the fit, but were told no one else would see them. It should be noted that in both experiments, responses to anticipated (rather than actual) threats were assessed. In both studies the experimental group had higher cortisol levels post-manipulation compared to the control groups, after controlling for baseline cortisol. In only the first study, state SPA differed between the two conditions, following the manipulation, with SPA higher in the experimental group than the control group, after controlling for trait SPA. It was suggested by the authors that women were more likely to feel threatened if their bodies had the potential of being evaluated by others.

The third study to explicitly investigate the application of SSPT to body image threats was conducted by Lamarche, Gammage, Kerr, Faulkner, and Klentrou (2014). In this study, women were randomized into either a control or threat group. In the threat condition participants were led to believe they would have a body composition assessment (e.g., three site skinfold) while wearing spandex shorts and a jog bra in the presence of two researchers, while control subjects sat quietly for 10 minutes. All participants completed shame and SPA measures as well as a measure of body dissatisfaction and provided saliva samples. Results of this study showed the anticipation of a social-evaluative body image threat elicited an increase in negative psychological self-conscious outcomes (shame and SPA) as well as body dissatisfaction, a non-self-conscious outcome pre to post response. There was no difference found between groups for body dissatisfaction. However, shame and SPA were significantly different between the threat and control condition and were found to be more sensitive when anticipating a social-evaluative threat. Lamarche et al. (2014) also found cortisol did not differ between

the control and threat condition. Therefore, the results are consistent with the growing evidence that suggests exposure to an actual social-evaluative threat is required for cortisol increases to occur.

More recently studies by Cloudt, Lamarche, and Gammage (2014) and Bailey, Lamarche, and Gammage (2014) examined SSPT in relation to a body image setting in women. Bailey et al (2014) had women read one of two scenarios: modeling a swimsuit in front of friends (high social-evaluative) and modeling a swimsuit alone respectively (low social-evaluative body image threat). Participants were asked to imagine themselves in one of the two scenarios and describe ways in which they would manage these situations. For the high social-evaluative threat condition, participants indicated they would avoid the situation or cope through appeasement or positive rational acceptance, consistent with SSPT. Similar maladaptive strategies were found for the low social-evaluative threat scenario.

Most recently, Cloudt et al. (2014) examined body shame, SPA, and cortisol responses in women randomly assigned to one of three conditions (group and individual social-evaluative threat, and a control, non-threat). Participants in the social-evaluative threat conditions were told they would have body composition measures done (e.g., skinfold) while wearing spandex shorts and a jog bra. Women in the control condition sat quietly. Results indicated shame, SPA, and cortisol responses did not differ based on the amount of social-evaluative threat (i.e., both threat conditions elicited similar responses). However, the two threat conditions were significantly higher in shame, SPA, and cortisol responses compared to the control condition.

To date Lamarche et al. (2012), Martin Ginis et al. (2012), Lamarche et al. (2014), Bailey et al. (2014) and Cloudt et al. (2014) are the only studies that have specifically applied SSPT to the study of body image by examining physiological and/or psychological responses to social-evaluative body image threats. One limitation to these studies, however, is they investigated only women. In addition, Martin Ginis et al. (2012) and Lamarche et al. (2014) and Cloudt et al. (2014) investigated responses to anticipated, not actual, threats and Bailey et al. (2014) examined scenario-based responses; none of the above studies investigated responses to an actual social-evaluative threat. However, research on social-evaluative threats suggests that not actually experiencing a social evaluation (e.g., anticipating a threat) may not elicit the same cortisol increases as the actual threat itself (Dickerson & Kemeny, 2004; Lamarche et al., 2014; Martin Ginis et al., 2012). Further, Martin Ginis et al. (2012) did not assess shame, which according to SSPT is the key psychological response to a social-evaluative threat.

Pilot work done by Lamarche et al. (in progress) attempted to examine if SSPT could also be applied to understanding body image in men. They conducted one-on-one interviews with college men, asking them about comfortable and uncomfortable body image situations and the context of those situations. Men were able to identify specific settings that they found uncomfortable (e.g., the gym, bar). Participants identified that these situations were made more uncomfortable by the presence of women, especially if the female resembled the ideal (thin and beautiful), by the presence of a male they regarded as more fit/attractive than themselves (the muscular ideal), and when less clothing was being worn (e.g., shirtless). Men also had a more difficult time identifying uncomfortable situations compared to comfortable ones. Participants also noted that men

do experience body image concerns just as women do. One participant described the body image concerns of men as just as common as concerns by women; however, he reported that many men feel they cannot discuss these concerns for fear of being seen as “a baby” or “unmanly”.

Current research on male body image is limited compared to what we know about female body image. No study has examined the psychobiological responses to these uncomfortable social-evaluative body image situations in men. Given the evidence of negative body image in males (Davis, Brewer, & Weinstein, 1993; Derenne & Beresin, 2006; McCabe & Ricciardelli, 2001; Pope et al., 1998) and the potential negative outcomes associated with poor body image it is important to better understand how men may respond to body image threats.

CHAPTER 2: RATIONALE, PURPOSE AND HYPOTHESES

2.1. Rationale

Past research has primarily focused on women's body image and the thin ideal with relatively less focus on men's body image (Cash & Pruzinsky, 2002; Murnen, 2011). However, recent research suggests men too struggle with body image and they report that they have just as many body image concerns as women (Lamarche et al., in progress; McCabe & Ricciardelli, 2004; Pope, Phillips, & Olivardia, 2000). For men the ideal is a well-defined, muscular upper body (especially, chest, shoulders, and arms), well-defined abdominals and a narrow waist; this is typically described as a "V-shaped" body (Pope et al., 1998). Further, for men strength is important (Algars et al., 2009; Cash & Pruzinsky, 2002; McCreary, 2011; McFarland & Petrie, 2012; Pope et al., 1998). In one qualitative research study, men reported experiencing uncomfortable feelings when they believed they were inadequate in strength, looks and/or muscularity, especially compared to other men. These uncomfortable body image situations were amplified in the presence of men with an ideal body, women (especially the thin ideal) or when wearing less clothing (e.g., shirtless; Lamarche et al., in progress).

Negative body image has been associated with many health-related concerns including increased depression, anxiety and unhealthy behaviours (e.g., physical inactivity, excessive exercise, eating disorders, dietary restraint, smoking; Chittester & Hausenblas, 2009; Lamb, 1984; McCreary & Sasse, 2000; Muth & Cash, 1997). In addition, recent research in women has found an association between body image concerns and the stress hormone cortisol (Martin Ginis et al., 2012; Putterman & Linden, 2006).

One particular type of body image threat that may be common is a social-evaluative threat in which an evaluative individual or audience is present. SSPT (Dickerson, Gruenewald et al., 2004) suggests that psychobiological responses, in particular shame and cortisol, can occur in the presence of a social-evaluative threat. Thus, this theory may be particularly relevant for investigating body image. According to SSPT, people monitor their environment for social-evaluative threats that may negatively affect their social status (Dickerson, Gruenewald et al., 2004). In situations where social-evaluative threat exists, there is potential for individuals to lose their social standing or status; SSPT suggests that the psychobiological responses act as a signal that this risk exists. Ultimately, people may engage in strategies such as appeasement, withdrawal, or avoidance, to reduce the risk of loss of social status, thereby avoiding rejection and protecting their social self (Dickerson, 2008; Gruenewald et al., 2004).

Researchers have identified several characteristics of situations that can increase the social-evaluative nature of the threat. For example uncontrollable situations, being videotaped, and making social comparisons (Dickerson & Kemeny, 2004; Martin Ginis et al., 2012; Rohleder et al., 2007) all tend to increase the social-evaluative nature of the threats. However, the majority of research investigating psychobiological responses to social-evaluative threats has used the Trier Social Stress Test (TSST), in which participants are required to give a 5-minute speech and perform a math task in front of a panel of judges (Kirschbaum et al., 1993). In one of the only other studies to examine cortisol responses to social-evaluative threats, competitive ballroom dancing was used as the social-evaluative threat. However, this is also a performance task.

More recently, SSPT has been applied to a different type of social-evaluative threat, body image threats. In a qualitative examination of uncomfortable body image situations, women identified two main themes: being in the presence of an ideal female (someone who is perceived as more attractive, in better shape or thinner) and body exposure, such as wearing a bathing suit or during intimacy (Lamarche et al., 2012). In an experimental study examining social-evaluative body image threats in women, these threats were associated with higher cortisol responses than non-social-evaluative body image threats (Martin Ginis et al., 2012). In addition similar findings have been shown in women with respect to shame and SPA where the anticipation of social-evaluative body image threats have been found lead to increases in shame and SPA (Cloudt et al., 2014; Lamarche et al., 2012; Martin Ginis et al., 2012).

Past body image research has focused on women and is relatively limited in men when it comes to uncomfortable body image situations and the potential psychological and physiological responses. Our own pilot work (Lamarche et al., in progress) has identified different body image situations college men find uncomfortable (i.e., the gym, bar). Men also reported that these situations are made more uncomfortable with the presence of attractive women, an ideal man, and/or while wearing less clothing. A few participants described men as having just as many body image concerns as women. However, most men believed body image concerns should not be discussed because of the fear of being seen as “a baby” or “unmanly” (Lamarche et al., in progress). Although shame, SPA and body dissatisfaction have not been explicitly examined following a social-evaluative threat, many situations described in previous research (e.g., an exercise facility) are consistent with characteristics of social-evaluative threat condition (i.e., there

is potential for negative evaluative of one's body; Barlett & Harris, 2008; Carron & Prapavessis, 1997; Kruisselbrink et al., 2004; Martins et al., 2007). Thus, preliminary evidence suggests that SSPT may also be useful for understanding social-evaluative body image threats in men.

Currently, no single theory of body image can account for psychological and physiological responses to body image threats. But, these threats are common and have potentially serious outcomes including poor self-esteem and self-efficacy, higher levels of depression, body dissatisfaction, and an overall increase in negative body image (Cash & Pruzinsky, 2002). Ultimately, findings of this study will allow us to identify situations and characteristics of these situations that may lead to negative health outcomes. Eventually, it may be possible to develop coping strategies for men in these uncomfortable body image situations.

2.2. Purpose

The purpose of this study was to examine the psychological (i.e., shame, SPA, body dissatisfaction) and physiological (cortisol) responses to a social-evaluative body image threat and non-social-evaluative body image threat in university men.

2.3. Hypothesis

It was hypothesized that men in the social-evaluative body image threat condition would report higher self-conscious (shame, SPA) and non-self-conscious (body dissatisfaction) emotions, as well as show higher cortisol immediately following the threat compared to those in the non-social-evaluative body image threat condition, after controlling for baseline values.

CHAPTER 3: METHODOLOGY

3.1. Participants

Men aged 17-25 years were eligible to participate, as men's body image concerns have been found to be highest in that age range (Pope et al., 2000). These body image concerns are typically related to the upper body and are associated with muscularity, leanness and strength (Pope et al., 1998). Exclusion criteria for this study included individuals with a history of a clinical eating disorder and varsity athletes as these factors can affect body image (Hausenblas & Fallon, 2006; Hausenblas & Symons Downs, 2001). Other exclusion criteria included factors that can affect cortisol function including smoking and specific medications (e.g., anti-depressants and corticosteroid-based medications; Burke, Davis, Otte, & Mohra, 2005) as well as specific medical conditions including Cushing's disease (Gold & Chrousos, 1985). On the day of the study participants were asked to refrain from participating in physical activity and consuming any food or drink for one hour prior to study participation. Participants were excluded if they did not follow these instructions.

3.1.1. Recruitment. Participants were recruited using posters (see Appendix A) placed around campus and announcements made in classes (see Appendix B). Participants were provided with a cover story intended to lead participants to believe they were participating in a study designed to explore hormones, physical characteristics and self-beliefs. Interested males contacted the principal researcher by e-mail. Once contact was made, inclusion and exclusion criteria were outlined and the letter of invitation (see

Appendix C) was attached in the reply e-mail. If criteria were met and the potential participant was still interested, the researcher set up a mutually convenient time to meet. All participants were offered course credit or \$10.00 as compensation for their time.

3.1.2. Sample Size. Prior research examining the psychobiological responses to a social-evaluative body image threat in women has yielded large effect sizes (Cohen, 1992): Cohen's d 's = .79-1.16 for SPA and cortisol (Martin Ginis et al., 2012). Based on these effect sizes with power = .80, α = .05, approximately 25 men per group were required; therefore the sample size consisted of approximately 70 men. This number accounted for an anticipated decrease in sample size due to participant drop-out, non-compliance to study requirements, and problems with cortisol sampling, based on our previous studies with women (Lamarche et al., 2014).

3.2. Procedures

Ethics clearance was received from the university research ethics board prior to commencement of the study (see Appendix D).

3.2.1. Study Design. The pre-post experimental design was a between-within subject design where each participant was randomly assigned to one of two conditions: social-evaluative or non-social-evaluative body image threat. Measures (saliva samples and body image questionnaires; see below for all descriptions) were completed multiple times over the course of the testing session and used for analysis.

3.2.2. Conditions. The foundation of the threat condition was based on pilot work done by Lamarche et al. (in progress). For this pilot study, interview data was collected whereby college men were asked to describe and contextualize threatening body image

situations. The preliminary results indicated that men identified social-evaluative situations (consistent with SSPT), particularly ones that included the evaluation of strength and muscularity by others, as the most uncomfortable situations related to the body. In particular, the gym was made reference to as a common threatening setting, coupled with several specific contextual factors (i.e., having their shirt off, the presence of attractive women or other muscular [ideal] men) that heightened the evaluative potential of any social setting. These findings were found to be consistent with previous research investigating men's social anxiety during exercise in relation to performance, appearance and desired outcome of exercise activity, specifically weight training (Roberts, Munroe-Chandler, & Gammage, 2009).

3.2.3. Social-Evaluative Body Image Threat Condition. In addition to the male and female researchers, a male confederate was present (described as a second participant), as well as a female confederate (described as research assistant). The male confederate represented the male ideal, described as having broad shoulders, a narrow waist, well-defined abdominals, and strong muscular arms and chest (McFarland & Petrie, 2012; Pope et al., 1998). The female confederate represented the female ideal, thin and pretty according to North American standards (Algars et al., 2009; Hart et al., 1989). Both confederates were present for all social-evaluative threat conditions. The principal student researcher was responsible for explaining all the procedures and answering any questions from participants.

The threat involved anthropometric and strength tests for both the confederate and participant. Participants were told that they would be provided with normative feedback

of their results, so they could see how their results compared with other men their age. In each case the male confederate was tested first, in front of the participant. All participants, including the male confederate, in the social-evaluative threat condition had anthropometric and strength measurements taken with their shirts off and in the presence of a video camera. Participants were told that measurements taken without wearing a shirt would allow for more accurate measures. They were also informed that the video camera allowed researchers to ensure that all procedures were performed correctly.

In each case, the male confederate was tested before the research participant. All measurements were read out loud by the principal student researcher to the female confederate (research assistant), who recorded all values, while also helping with anthropometric measures (e.g., ensuring the measuring tape was lined properly). The female research assistant then passed her clipboard with the recorded values to the male research assistant who left the lab for approximately 2 minutes and calculate body composition scores and norms based on the male confederate's anthropometric and strength measures. When he returned he would pass the "calculated values" to the female research assistant who read these values out loud, so that everyone could hear. Values indicated the male confederate tested in the healthiest range based on norms for men 18-25 years for BMI and had 8 percent body fat, indicating optimal levels, comparable to levels of an elite athlete. It was also stated that the male confederate was above the 90th percentile for strength, meaning he was stronger than 90% of men his age.

Next, the participant underwent the same anthropometric and strength tests using the same procedures. After he completed all tests, he was told that while the male

research assistant calculated strength and anthropometric measure values, questionnaires would need to be completed to save time, with saliva sample (S3) to follow. Participants then rested for 10 minutes. This was followed by the final saliva sample (S4). All anthropometric and strength results were made available to the participant at the end of the study if desired.

3.2.4. Non-Social-Evaluative Body Image Threat Condition. In the non-social-evaluative body image threat condition all data collection was done in a private setting where only the principal student researcher and male research assistant were present throughout the study (i.e., no confederates were present). The student researcher explained all the procedures and answered any questions the participant had. The participant underwent all anthropometric measurements (height, weight, percent body fat, and arm, chest, and waist circumference) as well as the strength measurement (using hand grip) using the same standardized protocols as the social-evaluative threat condition; however, all measurements were taken while the participant was wearing a t-shirt and in the absence of a video camera. In addition, anthropometric and strength measures were not read out loud, rather quietly recorded by the male research assistant. Finally a 20-minute rest period (compared to a 10-minute rest in the social-evaluative threat condition) followed the third saliva sample to account for the time it took to complete the confederates' measurements in the social-evaluative threat condition. Results from the measures were made available to the participant at the end of the study if desired.

3.3. Testing Procedures.

All data collection procedures took place in the exercise intervention lab (Welch Hall 16). All participants were tested between the hours of 3pm and 6pm to account for diurnal variations in cortisol (Dickerson et al., 2009). Figure 1 depicts the procedures that were followed and the flow of participants with an approximate timeline in each testing session of each condition.

Upon arrival to the lab, participants were asked to sit and provide informed consent (see Appendix E), followed by the first of four saliva samples (S1; see Saliva Collection Procedures below). The first saliva sample was taken as a baseline measure to ensure participants followed instructions (i.e., no eating or drinking an hour before arriving to the lab) and that they did not experience a psychological response to filling out questionnaires. Next participants completed demographic information (age, height, weight, university major, year in school, weight training history) as well as questions ensuring participants complied with the required elements outlined with respect to food, drink and physical activity participation (see Appendix F for all questionnaires). Also included were questions regarding previous or current diagnosis of a clinical eating disorder and any medical conditions that can affect cortisol (see Appendix F for all questionnaires). As well, participants completed a measure of physical activity (IPAQ [short]; Craig et al., 2003). Finally, participants were asked to complete a measure of the drive for muscularity (Drive for Muscularity Scale; DMS; McCreary & Sasse, 2000).

Next participants were asked to complete a series of three state body image questionnaires (Q1), randomized to avoid order effects: state SPA, state body

dissatisfaction, and state shame. Once completed, participants provided the researcher with a second saliva sample (S2).

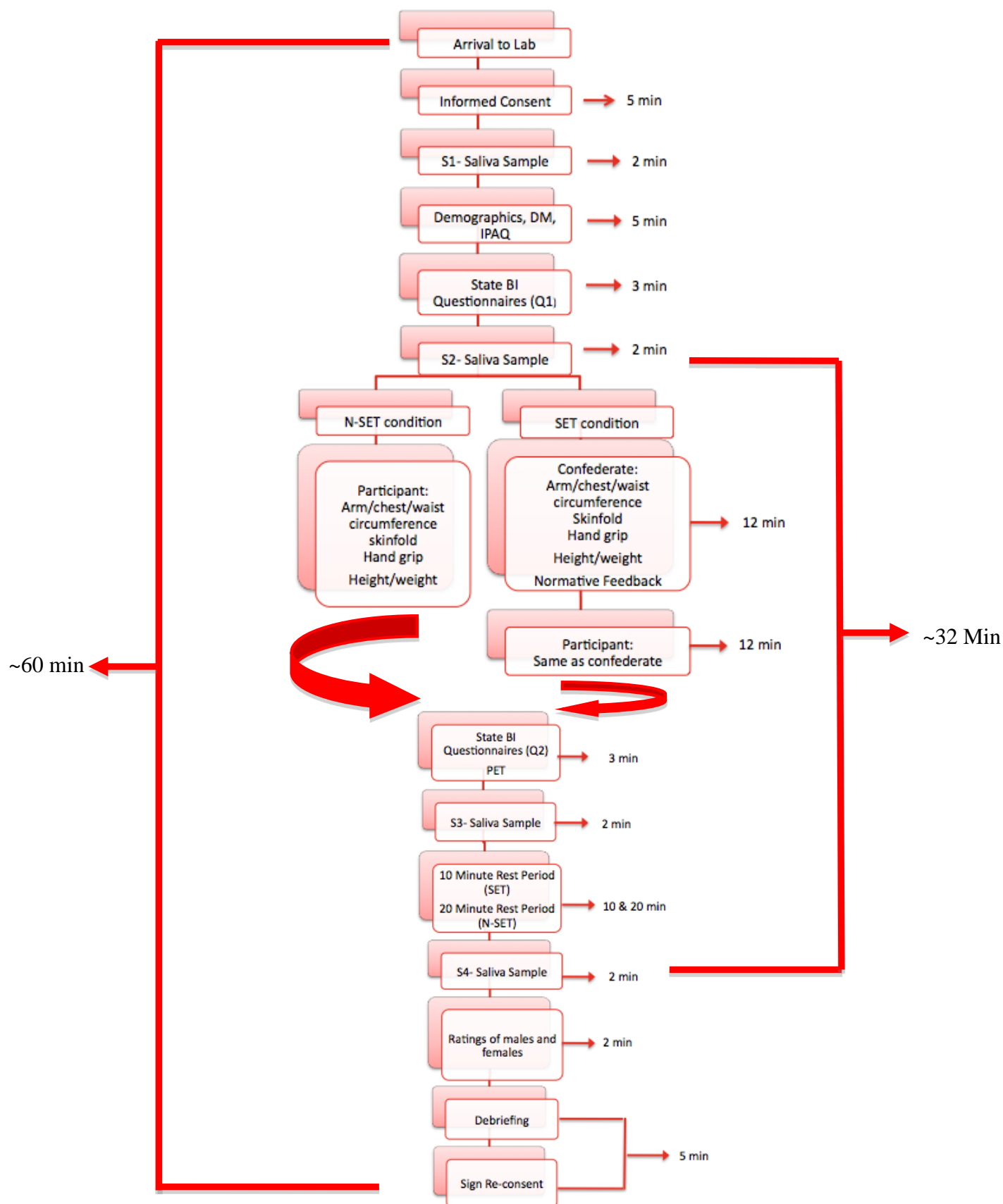
Participants then underwent their condition, depending on which group they had been randomly assigned to (see below for conditions). For both groups the body image situation was an assessment of anthropometric measures (height, weight, percent body fat, arm chest and waist circumferences) and strength (hand grip; see Anthropometric and Strength measures).

Immediately following their condition, participants completed the three state body image questionnaires (Q2), randomized, that were previously completed. This was followed by a measure of perceived evaluative threat (PET). Once these measures were completed, a third saliva sample (S3) was provided. This was then followed by a 10-minute quiet rest period (social-evaluative threat) and a 20-minute quiet rest period (non-social-evaluative threat) during which participants were asked to sit quietly and refrain from talking, drinking, eating, using laptops, cell phones and listening to music. A fourth and final saliva sample (S4) was then provided by the participants immediately following the rest period. Participants asked to rate the level of attractiveness of the female research assistant (in the social-evaluative threat condition only) and primary researcher, and the levels of muscularity/fitness of the other participant (in the social-evaluative threat condition only) and the male research assistant (see Perceptions: Male and Female below).

Lastly participants were provided with a complete debriefing. The researcher informed participants of the true purpose of the study, the use of deception and rationale,

as well as described the different conditions (social-evaluative threat and non-social-evaluative threat; see Debriefing Script in Appendix G). Finally, participants were asked to sign a re-consent form (see Re-Consent in Appendix H) due to the use of deception. If they desired, participants were able to request a summary of the study results (see Appendix I).

Figure 1. A visual representation of the flow of each testing session.



3.4. Anthropometric Measures

Participants were asked to standing for arm, chest, and waist circumference measures (taken using a measuring tape). Flexed bicep was measured by placing the measuring tape around the largest part of the participant's flexed bicep and recorded to the nearest centimeter. Measurements were taken three times for each arm to ensure accuracy. Chest circumference was measured with the tape placed around the widest part of the participant's chest, recorded to the nearest centimeter and performed three times. Waist circumference was taken at the top of the iliac crest and also recorded to the nearest centimeter, and taken three times (Arderin, Janssen, Ross, & Katzmarzyk, 2004; Klipstein-Grobisch, Georg, & Boeing, 1997; Taylor & Behnke, 1961). Measurements started with flexed biceps moved to chest and onto waist then back to flexed biceps three times. Waist circumference is a known valid way to determine fat distribution (Taylor, Jones, Williams, & Goulding, 2000) and flexed bicep and chest circumference have been found to be reliable forms of basic anthropometric measures (Klipstein-Grobisch et al., 1997).

Percent body fat was measured using a two-site skinfold test, with measures taken from the thigh and subscapula. Participants were asked to stand while the subscapular measure was taken one to two centimeters below the inferior angle of the scapula (diagonal fold). The thigh measurements were taken at the anterior midline, midway between the proximal border of the patella and inguinal crease (vertical fold; Bray et al., 1978). Measurement sites were first landmarked. Once the measurement site was marked, skin was pinched with the thumb and forefinger about 0.5 inches from the measurement

site. Skin was gently lifted allowing tissue to separate from the underlying muscle. Each measurement was taken three times, allowing for 4 seconds before reading the calipers. If the difference between the first and second measurement was greater than 1 millimeter, a forth measurement was taken. The mean value was then calculated and used. Skinfold measures were used to calculate body density using the following formula: (Body density = $1.1043 - (0.001327 \times \text{thigh skinfold in mm}) - (0.00131 \times \text{subscapular skinfold in mm};$ Sloan, 1967). Using this body density value, percent body fat was calculated using the Siri equation: Percent fat = $[(495 / \text{Body Density}) - 450]$ (Siri, 1961). This method and the use of calipers has been found to be reliable in previous research (Sloan & Shapiro, 1972).

Participants then underwent a strength assessment which was measured using a hand grip dynamometer. Participants were asked to stand with the hand grip in one hand, held out so it was in line with their shoulder and their arm was in a straight horizontal line. They were asked to take a deep breath, exhale and squeeze the grip as tight as they could while slowly lowering it towards their leg without contacting their leg. This procedure was repeated two times each side (alternating sides) and the highest score for each side was summed to get their score which was recorded (Mathiowetz, Weber, Volland, & Kashman, 1984). The hand grip dynamometer has been found to be highly reliable and valid for measuring hand grip strength (Bellace, Healy, Besser, Byron, & Hohman, 2000).

Finally, height was tested using a stadiometer. Participants were asked to stand tall with their feet flat (no shoes or socks) and heels tight to back of the stadiometer.

Next, participants were instructed to take a deep breath and exhale as the moveable arm was lowered until contact was made with the top of the participant's head. This value was represented the participant's height and was recorded to the nearest millimeter (Lund, 1995). Weight was measured to the nearest tenth of a kilogram using a standard scale. Participants were asked to keep their shoes and socks off and step onto the scale, remaining still until the final number settled on the scale's screen. Height and weight values were used to calculate BMI.

3.5. Measures

3.5.1. Demographic Questionnaire. Self-reported demographic variables including age, race, sexual orientation, height, weight, type of physical activity participation (number of days per week engaged in a minimum of 30 minutes of exercise), major, year in school, history of a clinical eating disorder, varsity athlete status, smoker, and current medications that may affect cortisol were self-reported. In addition, participants were asked if anything stressful happened earlier in the day or on the way to testing. Participants were also asked if they participated in any physical activity or ate/drank anything prior to testing, and if they felt well. These additional items were asked as these factors may all affect cortisol.

3.5.2. International Physical Activity Questionnaire [Short] (IPAQ-S Craig et al., 2003). Participants filled out the 9-item self-report IPAQ-S questionnaire that has shown evidence of reliability and validity when used to assess physical activity in adults aged 18-65 years (Craig et al., 2003). The short form has been found to be more feasible to administer compared to the long version with no difference in reliability and validity.

Its use was found to be substantially more valid in men than women (Wolin, Heil, Askew, Matthews, & Bennett, 2008). Individuals were first asked to indicate the number of days in the past week on which they performed each of vigorous, moderate and mild (walking) intensity activities (e.g., “During the **last 7 days**, on how many days did you do **vigorous** physical activities?”). Then for each intensity greater than zero, participants were asked to indicate on average the amount of time they spent doing that intensity activity per day. For each intensity, the number of days per week was multiplied by the average time to get a total number of minutes over the past 7 days. The IPAQ assigns known MET values to walking, moderate and vigorous intensity activities (3.3 METs, 4.0 METs, and 8.0 METs respectively; Wolin et al., 2008). These values were multiplied by the total minutes per week for each intensity. For the present study the values for moderate and vigorous activities were summed to get a total moderate-vigorous physical activity score in MET min/week. Walking was excluded from analysis based on Health Canada Physical Activity Guidelines (Bryan & Katzmarzyk, 2009) and this approach has been successfully used in numerous studies (Faulkner, Arbour-Nicitopoulos, & Hsin, 2010, Prochaska, Spring, & Nigg, 2008).

3.5.3. Drive for Muscularity Scale (DMS; McCreary & Sasse, 2000).

Participants were asked to complete the DMS, a 15-item questionnaire consisting of 2 subscales, muscularity-oriented attitudes and muscularity-oriented behaviours, with 7 and 8 items respectively. Participants were asked to rate the extent to which each statement applies to them on a scale from 1 = *always* to 6 = *never*. The DMS assesses individuals' attitudes regarding their muscularity and behaviours associated with the desire to be more

muscular (e.g., “I think I would feel more confident if I had more muscle mass”). This scale has demonstrated adequate validity and reliability in college men, with a greater score on the DMS associated with wanting to increase muscularity and greater amounts of weight training (McCreary & Sasse, 2000). Internal consistency in the present study was deemed adequate ($\alpha = .86$)

3.5.4. Body Image State Scale (BISS; Cash, Fleming, Alindogan, Steadman, & Whitehead, 2002). This 6-item questionnaire was developed to measure the momentary evaluative/affective experiences (i.e., satisfaction/dissatisfaction) of one’s physical appearance. The 6 items cover body size and shape, weight, feelings of physical attractiveness/unattractiveness, looks relative to current feelings, and evaluation of appearance relative to how the average person looks. For each item participants were asked to indicate how they feel **right now at this very moment** on a 9-point scale (e.g., from 1 = *extremely dissatisfied* to 9 = *extremely satisfied* at the moment ‘with my physical appearance’). Items were coded so higher scores represented greater satisfaction with one’s body. Evidence of reliability and validity of the BISS in both men and women to determine individuals’ evaluative/affective body image states has been demonstrated (Cash et al., 2002). Internal consistency in the present study for all time points was deemed adequate (α ’s ranged from .84 to .91).

3.5.5. Weight and Body Related Shame Scale (WBRSS; Conradt et al., 2007). This scale was developed as a measure of body shame and guilt related to attempts to control weight. The shame subscale (referring to the failure or shortcomings attributed to oneself as an object) of the WBRSS was used to assess participants’ feelings of shame

related to their bodies at that moment in time. It is a 6-item scale with each item rated on a 5-point scale, ranging from 0 = *strongly disagree* to 4 = *strongly agree* (e.g., “Right now, I feel ashamed because others can see my body”). The WBRSS has been found to be psychometrically sound when measuring feelings of body shame and guilt in men and women with concerns related to weight with both subscales found to have excellent internal consistencies (Conradt et al., 2007). Each subscale was found to have excellent internal consistency over previous subscales (Conradt et al., 2007). Internal consistency in the present study for all time points was deemed adequate (α 's ranged from .91 to .94).

3.5.6. State Social Physique Anxiety Scale (S-SPAS; Kruisselbrink et al., 2004). The S-SPAS is a modified version of the 9-item SPA Scale (Martin, Rejeski, Leary, McAuley, & Bane, 1997), which was originally twelve items (Hart et al., 1989). It was used to assess situational concerns over one's body being evaluated by others. Items on the S-SPAS are measured on a 5-point scale ranging from 1 = *not at all characteristic of me* to 5 = *extremely characteristic of me*. The S-SPAS has demonstrated validity and reliability in adult men and women (Kruisselbrink et al., 2004; Martin Ginis, Murru, Conlin, & Strong, 2011). Internal consistency in the present study for all time points was deemed adequate (α 's ranged from .89 to .92).

3.5.7. Perceived Evaluative Threat (PET; Focht & Hausenblas, 2004; Hart et al., 1989). The PET is a single item that measured an individual's perception of the level of threat in terms of having his body evaluated by others. Participants were asked to rate how threatening they perceived the anthropometric and strength assessments with respect

to being judged by others using a 5-point Likert scale ranging from 0 = *not at all* to 4 = *extremely*.

3.5.8. Post Condition Manipulation Checks. Participants were asked indicate how attractive they found the female confederate and female researcher 1 = *not at all attractive* to 5 = *very attractive*. Finally, they were asked to indicate how closely the build of the male confederate and male research assistant matched their ideal in terms of muscularity on a scale from 1 = *not at all my perception of the muscular ideal* to 5 = *my exact perceptions of the muscular ideal*.

3.6. Saliva Collection Procedures

Saliva samples were collected on four separate occasions throughout the study and voluntarily provided by each participant. Samples were collected using Salivettes specific for cortisol measurement. Participants were asked to sample their own saliva by placing the piece of sterile synthetic swab into their mouth and letting it absorb into the swab for a total of one minute. Participants were then asked to carefully guide the swab back into the container using their mouth and avoid touching the edges of the tube with their hands as they put the cap back on the container. Once sealed participants handed their sample to the researcher which was centrifuged immediately and stored in a -20 °C freezer until analysis. This procedure was hygienic and posed minimal risk to the participant or researcher and this type of measure is commonly used in research as an indicator of psycho-social stress (Dickerson & Kemeny, 2004).

3.7. Salivary Cortisol Assay Determinations

Saliva was centrifuged at 3000xg for 15 minutes and only the supernatant was assayed. All enzyme immunoassays were carried out on NUNC Maxisorb plates. Cortisol antibodies (R4866) and corresponding horseradish peroxidase conjugate were obtained from C. Munro of the Clinical Endocrinology Laboratory, University of California, Davis. Steroid standards were obtained from Steraloids, Inc. Newport, Rhode Island. Plates were first coated with 50 µl of antibody stock diluted at 1:8500 in a coating buffer (50 mmol/L bicarbonate buffer pH 9.6). Plates were then sealed and stored for 12–14 hours at 4 °C. A 50 µl wash solution (0.15 mol/L NaCl solution containing 0.5 ml of Tween 20/L) was added to each well to rinse away any unbound antibody, then 50 µl phosphate buffer per well was added. The plates were incubated at room temperature for 2 hours before adding standards, samples, or controls. Two quality control salivary samples at 30% and 70% binding (the low and high ends of the sensitivity range of the standard curve) were prepared. 50 µl cortisol horseradish peroxidase conjugate was added to each well, with 50 µl of standard, sample, or control. After plate loading, plates remained incubated for 1 hour. Next, the plates were washed with 50µl wash solution and 100µl of a substrate solution of citrate buffer, H₂O₂ and 2,2'-azino-bis (3-ethylbenzthiazoline-6-sulfonic acid) were added to each well. The plates were covered and incubated while shaking at room temperature for 30–60 min. The plates were then read with a single filter at 405 nm on the microplate reader (Titertek multiskan MCC/340). Blank absorbances were obtained, standard curves generated, a regression line was fit to the sensitive range of the standard curve (typically 40 – 60 % binding) and samples were interpolated into the equation to get a value in pg per well. Each sample

was assayed in duplicate and averages were used. Interplate variation (CV) is 6.45% while intraplate variation is 6.51%.

3.8. Data Entry and Analysis

All data from questionnaires and cortisol concentrations were entered into SPSS version 20.0.

3.9. Data Screening and Treatment of Missing Values

After data entry was complete, the data set was screened visually for missing data and implausible values. If data was entered incorrectly items were corrected. If less than 5% of the data was missing and it was random, missing items were replaced by the series mean.

3.10. Subscale Recoding and Scoring

3.10.1. BMI. For each participant weight (kg) was divided by height (m^2) to yield a score representing each participant's BMI.

3.10.2. IPAQ-short (Craig et al., 2003). IPAQ guidelines (<http://www.ipaq.ki.se/scoring.pdf>, 2005) were followed for scoring the IPAQ. This scoring is based on the assumption that an average individual sleeps for approximately eight hours per day in order to account for unreasonably high values. Firstly, all cases where walking, moderate or vigorous daily minutes exceeded 180 minutes were recoded to be equal to 180 minutes. This allowed a maximum of 21 hours of activity in a week for each category. A total of 14 cases exceeded the daily duration of 180 minutes and were therefore recoded to a value to 180 minutes. Secondly total weekly duration of physical

activity could not exceed 960 minutes. If the total weekly duration exceeded 960 minutes the case was deleted from analysis. However, no cases in this sample exceeded 960 minutes.

Next, total moderate, and vigorous MET-minutes/week scores were calculated using the IPAQ short formula: (4.0 METs x number of minutes x number of days/week of moderate PA; 8.0 METs x number of minutes x number of days/week of vigorous PA). Finally, moderate and vigorous scores were summed together to calculate total number of MET-minutes per week participants engaged in moderate-vigorous physical activity.

3.10.3. DMS (McCreary & Sasse, 2000). All items on the DMS were reverse coded so that higher scores represented a higher drive for muscularity. An overall mean score for each participant's total drive for muscularity score. In addition, the means for the two subscales (muscularity oriented behaviours and muscularity oriented attitudinal) were calculated (McCreary, 2011).

3.10.4. WBRSS (Shame; Conradt et al., 2007). A body shame score was calculated for each participant using the mean value for all items on the questionnaire. Both pre- and post-threat scores were calculated with higher scores representing greater body shame.

3.10.5. S-SPAS (Kruisselbrink et al., 2004). The fifth and ninth items were reverse coded. The mean of all nine SPA items used in the questionnaire was calculated for each participant pre- and post-threat. Higher scores represented higher SPA.

3.10.6. BISS (Cash et al., 2002). A body image dissatisfaction/satisfaction score, with respect to overall physical appearance, was calculated for each participant, pre- and

post-threat using the mean value of all items in the questionnaire. Items 2, 3, 4, and 6 were reverse coded so a higher score represented great body dissatisfaction.

3.11 Descriptive Statistics and Correlations

3.11.1 Means (*M*) and Standard Deviations (*SD*) by Group. All *M* and *SDs* were calculated at each time point, for each variable used throughout the study (S-SPAS, BISS, WBRSS, IPAQ-S, DMS, PET, demographics, and cortisol).

3.11.2 Correlations by Group. Before hypotheses testing, a correlation analysis was conducted to determine if any relationships existed between variables.

3.12 Testing of Assumptions

3.12.1 Univariate normal distribution. For each measure (DMS, IPAQ, WBRSS, S-SPAS, BISS) univariate normal distribution was checked. SPSS 20.0 Statistical Software was used to calculate mean, median, and mode values. These values were compared to ensure they were similar. Skewness and kurtosis values were checked to ensure they were < 3 . Data was also plotted on a histogram to determine visually if there was an approximately symmetrical bell curve pattern indicating a normal distribution. If normal distribution was violated, proper steps were taken, depending on skewness and kurtosis values, the data was transformed so it became normally distributed (Field, 2009).

3.12.2 Independent random sampling. Participants were sampled through the use of undergraduate class announcements and posters advertisements placed throughout

the Brock University campus. This assumption was violated because there is profound dependence on volunteers.

3.12.3 Equal sample sizes among groups. To ensure approximately equal sample sizes in the social-evaluative threat and non-social-evaluative threat conditions, each recruited participant was randomly assigned to one of the two conditions.

3.12.4. Univariate outliers. A univariate outlier was described as any value that was greater or less than 3 [*SD*] from the mean of each individual variable. Outliers were identified through the calculation of z-scores with any value greater than 3.29 flagged as a potential outlier. All univariate outliers were changed to be within 1 *SD* of the next most extreme value of that variable (Field, 2009).

3.12.5. Multivariate outliers. Multivariate outliers were checked to see if any unusual combinations of variables were reported. Mahalanobis' distance (MAH) was calculated for each participant. Outliers were tested by using a critical value from a chi squared table based on degrees of freedom for the number of variables measured ($n = 4$). Multivariate normality was assumed when none of the MAH values were above our critical value of 9.49. If a MAH was higher than our critical value the case was examined for potential deletion from the dataset (Field, 2009).

3.12.6. Linearity. The variables measured in the study (SPA, body image satisfaction, shame, physical activity, drive for muscularity and cortisol) were paired and plotted on scatterplots to ensure each combination displayed a relatively straight line.

3.12.7. Absence of multicollinearity. To ensure there was no redundancy in the data, correlations between the assessed variables in the study (SPA, body image

satisfaction, body shame, physical activity, drive for muscularity, and cortisol) were examined. Absence of multicollinearity was assessed and assumed when all Pearson's Correlation (r) values were below .90 (Field, 2009).

3.12.8. Homogeneity of variances. To ensure variance between each experimental condition was equal, Levene's Statistic was calculated. A non-significant p -value (above .05) for Levene's Statistic suggested homogeneity of variance between conditions (Field, 2009).

3.13. Manipulation Checks

3.13.1. Group equivalence. A series of t -tests were conducted for all demographic, anthropometric, drive for muscularity, physical activity, and pre-manipulation body image state measures between groups (social-evaluative threat and non-social-evaluative threat) to ensure there were no between group differences. An adjusted p -value was calculated using a Bonferroni-correction based on four analyses (.05/4). A new p -value of .013 was calculated to control for family-wise error.

3.13.2. PET. To ensure that participants perceived the social-evaluative threat to be more uncomfortable in the social-evaluative threat condition than the non-social-evaluative threat condition, an independent t -test was conducted to determine if there was significant difference between conditions.

3.13.3. Appearance evaluations of confederates. To ensure participant's found the male and female confederates close to the ideal according to North American standards, means were calculated and visually inspected in the social-evaluative threat condition.

3.14. Hypothesis Testing

If correlations were found between study variables, anthropometric, strength, DMS and/or IPAQ measures were entered as a covariate where appropriate.

1. It was hypothesized that participants in the social-evaluative threat condition would show higher self-conscious (shame, SPA) and non-self-conscious emotions (body dissatisfaction) following the social-evaluative threat, compared to the non-social-evaluative threat participants. For self-conscious (*shame* and SPA) and non-self-conscious emotions (body dissatisfaction) three separate analyses of covariance (ANCOVA) were conducted. The *condition* (social-evaluative, non-social-evaluative threat) was treated as the independent variable. Post-measures of self-conscious (*shame* and SPA) and non-self-conscious emotions (body dissatisfaction) were the dependent variables. Pre-measures of *shame*, SPA and body dissatisfaction were the covariates respectively.

2. It was hypothesized that participants in the social-evaluative threat condition would show higher levels of cortisol following the social-evaluative threat, compared to the non-social-evaluative threat participants. To compare the time course of cortisol response to a social-evaluative body image threat two separate ANCOVAs were conducted. *Post-cortisol* levels (S3 and S4) were used as the dependent variables to examine immediate differences following the condition (S3) and to capture the peak cortisol difference (S4) based on meta-analytic findings of cortisol responses to social-evaluative threats (Dickerson & Kemeny, 2004). *Condition* (non-social-evaluative threat,

social-evaluative threat) was used as the independent variable and pre-threat (S2) cortisol level was the covariate.

CHAPTER 4: RESULTS

4.1. Treatment of Missing Data

All data (from the 74 participants who completed the data collection) was entered into SPSS version 20.0 and visually screened using frequencies for incorrect values and to determine if any data was missing. All participants completed their condition. Two participants had weight values that were flagged as incorrect. These values were cross referenced with participant's original demographic information sheet and replaced with the proper values. One participant had missing data for ethnicity, and three participants did not include their sexual orientation. Overall, less than 5% of data were missing from all study variables with no pattern emerging; therefore, participant data was left missing (Field, 2009). Further, two participants each had one saliva sample with an insufficient amount of saliva present after being centrifuged. One participant was in the social-evaluative threat condition and one was in the non-social-evaluative threat condition and both missing samples were baseline levels (S1) and were not required for overall cortisol analysis. Therefore, missing values were replaced with series mean.

4.1.1. Inclusion criteria. A total of 8 participants (7 social-evaluative threat and 1 non-social-evaluative threat) were deleted from the sample based on failing to meet the inclusion criteria (e.g., being on antidepressants, varsity athletes), revealing they “knew something was up” during the study and one participant was removed because his post-measures of SPA, shame and body dissatisfaction were missing. The final sample consisted of a total of 66 participants, 35 in the non-social-evaluative threat condition and 31 social-evaluative threat condition.

4.2. Data Screening

4.2.1. Univariate outliers. Univariate outliers were identified using z-scores, with any value greater than 3.29 flagged as a potential outlier. Z-scores were calculated for all pre- and post-SPA, shame, and dissatisfaction, as well as IPAQ, age, body fat percent and cortisol at each time point. No z-scores > 3.29 were found for demographic and psychological measures. One participant was flagged as a potential outlier for BMI and body fat percentage. Upon inspection, his BMI was 44.92 (healthy range is between 18.5 and 24.9 according to Health Canada, 2011) and percent BF was 46.84. Therefore, he was deleted from the sample, as he was classified as morbidly obese, and likely differed in many aspects of body image and anthropometric values from the rest of the sample. Two participants, one in the social-evaluative threat condition and one in the non-social-evaluative threat condition were found to have all four cortisol z-scores slightly above > 3.29 . However, because cortisol is a physiological response these participants were not removed from analysis as the cortisol values found represent their true biological responses.

4.2.2. Multivariate outliers. Multivariate outliers were assessed by calculating Mahalanobis' distance (MAH) for each participant. Potential outliers were tested against the critical value of 18.467 from a chi squared table based on the degrees of freedom $n=4$ and $p < .001$. No values were found to be greater than the critical value and therefore no multivariate outliers were identified.

4.3. Assumptions

4.3.1. Univariate normal distribution: Skewness and kurtosis. Skewness and kurtosis values were calculated for all variables and visually inspected. Any values not falling within the range of -3 to 3 were flagged as potential outliers. All values fell within this range, indicating the assumption of normality was met.

4.3.2. Independent random sampling. This assumption was violated as participants were sampled through the use of undergraduate class announcements and poster advertisements. Therefore, profound dependence was placed on volunteers.

4.3.3. Equal sample sizes among groups. Participants were randomly assigned to either the social-evaluative threat or non-social-evaluative threat condition. Groups were at almost equal sizes (35 in the non-social-evaluative threat condition and 31 in the social-evaluative threat condition) once data collection was completed and after data screening occurred.

4.3.4. Linearity. Values for SPA, body image satisfaction, shame, physical activity, drive for muscularity and cortisol were paired and plotted using bivariate scatterplots. These scatterplots were then visually inspected to ensure each combination displayed a straight line relationship. The assumption of linearity was met as no evidence of a non-linear relationship was found within the combinations of variables.

4.3.5. Absence of multicollinearity. Correlations by group were examined between each variable assessed in the study (SPA, body dissatisfaction, shame, physical activity, drive for muscularity and cortisol). Pearson's correlation (r) values were used, with values below .9 indicating an absence of multicollinearity. Body shame pre- and

post-measures were slightly above .9 at .95, however, because r was only slightly greater than the cutoff value the variables were not removed from analysis.

4.3.6. Homogeneity of variance. Levene's statistic was calculated to ensure variances between each experimental condition were approximately equal. A non-significant p -value (above .05) suggests homogeneity of variance between conditions. For all dependent variables, this assumption was met as all p 's > .05.

4.4. Manipulation Checks

4.4.1. Group equivalences on demographic and psychological. A series of t -tests were conducted for all demographic and anthropometric variables, drive for muscularity, physical activity measures between the social evaluative and non-social-evaluative threat conditions (see Table 1). Only moderate/vigorous physical activity was significantly different between the social evaluative and non-social evaluative threat condition, with the non-social evaluative threat condition more physically active than the social evaluative threat condition ($t_{(65)} = 1.07, p < .05$). There were no other differences between the two conditions. Differences in pre-self-conscious (shame and SPA) and non-self-conscious (body dissatisfaction) measures were also examined through a series of t -tests. None of these measures were statistically different between the two conditions (see Table 1). Therefore, randomization appeared to be effective.

Table 1*Means and standard deviations (SD) by condition*

Variable	Non-social-evaluative threat (<i>n</i> =35)	Social-evaluative threat (<i>n</i> =31)
	Mean (SD)	Mean (SD)
Age	21.40 (3.00)	20.45 (1.96)
% Body Fat	20.13 (6.62)	21.27 (6.23)
Total DM	2.96 (.91)	3.15 (.75)
BMI	24.90 (3.18)	23.55 (3.05)
Mod/Vig IPAQ	1538.83 (919.55)	1448.79 (1220.90)*
Weight Training Frequency	2.87 (1.84)	2.73 (2.17)

Note. DM = drive for muscularity ranges from 1 (never) to 5 (always). BMI = body mass index. Mod/VigIPAQ = moderate/vigorous physical activity, measured in MET minutes/week. Weight training frequency was measured in days/week.

* $p < .05$

4.4.2. Group equivalences on cortisol (physiological variable).

Baseline measures of cortisol were analyzed using an independent sample *t*-test to determine if there were differences in baseline cortisol between the two conditions. Results indicated that baseline levels of cortisol were not significantly different between the social-evaluative and non-social-evaluative threat conditions ($p > .05$; see Table 2).

4.4.3. PET.

An independent *t*-test was conducted to determine if participants in the social-evaluative threat condition perceived the threat to be more uncomfortable ($M = .87$; $SD = 1.15$) than participants in the non-social-evaluative threat ($M = .46$; $SD = .66$)

condition (see Table 2). There was a significant difference between the two conditions with those in the social-evaluative threat condition reporting higher perceptions of the threat ($p < .05$)

Table 2

Means and SD and Estimated Marginal Means (EMM) of psychological and physiological variables by condition

Variable	Non-social-evaluative threat (<i>n</i> = 35)			Social-evaluative threat (<i>n</i> = 31)		
	Pre-Threat (SD)	Post-Threat (SD)	EMM	Pre-Threat (SD)	Post-Threat (SD)	EMM
SPA	2.08 (.58)	1.98 (.66)	2.06	2.26 (.89)	2.49 (.89)**	2.40
WBRSS	.54 (.67)	.50 (.70)	.56	.66 (.78)	.83 (.96)*	.77
BISS	6.15 (1.21)	6.10 (1.26)	5.97	5.88 (1.19)	5.18 (1.60)**	5.32
		Mean (SD)				Mean (SD)
PET		.46 (.66)			.87 (1.15)*	
Cortisol						
Baseline: S1		2.83 (3.50)			3.16 (5.88)	
Pre-threat: S2		3.03 (3.40)			2.98 (3.81)	
Post-threat 1: S3		2.58 (2.05)			3.39 (2.89)**	
Post-threat 2: S4		2.84 (2.73)			4.26 (4.03)**	

Note. EMM = estimated marginal mean. SPA = social physique anxiety, ranging from 1 = not at all characteristic of me to 5 = extremely characteristic of me. WBRSS = body shame, ranging from 0 = strongly disagree to 4 = strongly agree. BISS = body dissatisfaction, ranging from 1 to 9 (satisfaction/dissatisfaction of one's physical appearance) with a lower value associated with greater body dissatisfaction. Cortisol was measured at four time points in ng/mL; S1 was taken approximately 5 minutes after arrival to the lab; S2 was taken approximately 12 minutes post arrival; S3 was taken approximately 10-15 minutes post-threat initiation in the non-social-evaluative threat condition and 20-25 post-threat initiation in the social-evaluative threat condition; S4 was taken approximately 30-32 minutes post-threat initiation in both conditions.

* $p < .05$, ** $p < .01$

4.4.4. Appearance evaluations of confederates. Means scores for similarities of the male and female confederates to the North American ideal were calculated in the social-evaluative threat condition only and were inspected to ensure participants found the confederates to be close to the ideal according to North American standards. For the female confederate, $M = 3.43$, $SD = .68$ out of 4, a value considered to meet the standards of the female ideal for thinness and beauty. For the male confederate, $M = 2.75$, $SD = .92$ out of 4. This value, though was slightly lower was still representative of the male confederate being close to the muscular ideal for men.

4.5. Descriptive Statistics

Descriptive statistics for psychological and physiological variables were calculated for the social-evaluative and non-social-evaluative threat conditions for descriptive study variables (see Table 2). Correlations were conducted to determine if there were relationships with potential co-variates (age, body composition, drive for muscularity, moderate vigorous physical activity) and body image and cortisol measures prior to hypothesis testing (see Table 3). In the non-social-evaluative threat condition, moderate-vigorous physical activity was correlated with post-SPA measures and in the social-evaluative threat condition age was correlated with post-SPA and post-shame. Given that these correlations were very small, and that there were only two significant correlations, none of these variables were used as covariates in subsequent analyses.

Table 3

Correlation of cortisol and post-threat body image measures with participant characteristics

	Non-social-evaluative threat				Social-evaluative threat			
	Post Cortisol	Post SPA	Post Shame	Post BD	Post Cortisol	Post SPA	Post Shame	Post BD
Age	-.04	-.13	.06	.07	-.16	.46**	.42*	-.31
% Body Fat	.09	.17	.15	-.15	-.09	-.06	-.01	.15
BMI	.06	-.10	-.09	.11	.12	-.18	-.25	.34
DM	-.13	.10	-.04	-.20	.14	.18	.14	-.21
Mod/VigIPAQ	-.21	-.43*	-.33	.29	.03	-.06	.05	.08

Note. BMI = body mass index with a normal range between 18.5 and 24.9. DM = drive for muscularity and ranges from 1 (never) to 5 (always). Mod/VigIPAQ = moderate/vigorous physical activity, measured in MET minutes/week. SPA = social physique anxiety; BD = body dissatisfaction.

* $p < .05$. ** $p < .01$

4.6.1. Research Question #1: Self-conscious and non-self-conscious emotions.

Two separate analyses of covariance (ANCOVAs) were conducted to test the first hypothesis that state self-conscious emotions (shame and SPA) would be higher in the social-evaluative versus the non-social-evaluative threat condition post-threat after controlling for pre-threat measures. Pre-test measures served as the covariate while condition (social-evaluative and non-social-evaluative threat) was used as the independent variable. Post-threat measures of shame and SPA served as the dependent variables. Results of the ANCOVAs showed there were significant differences in both shame and SPA between conditions following the threat while controlling for pre-threat measures (shame: $F_{(1,63)} = 7.09$, $p = .010$, $\eta_p^2 = .10$ and SPA: $F_{(1,63)} = 11.01$, $p = .001$, $\eta_p^2 = .15$). Examination of means showed participants in the social-evaluative threat condition had higher shame and higher SPA after the threat than the participants in the non-social-evaluative threat condition (see Table 2). As a result, participants in the social-

evaluative threat condition experienced greater increases in shame and SPA after undergoing the social-evaluative body image threat compared to participants in the non-social-evaluative threat condition when controlling for pre-threat measures of shame and SPA respectively.

An analysis of covariance (ANCOVA) was conducted to examine the hypothesis that the non-self-conscious emotion (body dissatisfaction) would be higher in the social-evaluative threat versus the non-social-evaluative threat condition post-threat while controlling for pre-threat values. Pre-threat measure of body dissatisfaction served as the covariate, condition (social-evaluative versus non-social-evaluative) was the independent variable and body dissatisfaction was the dependent variable. The results of the ANCOVA showed there was a significant difference in body dissatisfaction between conditions following the threat ($F_{(1,63)} = 6.75, p = .001, \eta_p^2 = .17$). Participants in the social-evaluative threat condition were more dissatisfied with their bodies post-threat than were the participants in the non-social evaluative threat condition (see Table 2). In other words participants in the social-evaluative body image threat condition experienced greater body dissatisfaction after undergoing the threat compared to the non-social-evaluative threat condition when controlling for pre-threat measures of body dissatisfaction.

4.6.2. Research Question #2: Cortisol. Two ANCOVAs were conducted to determine if cortisol levels were higher in the social-evaluative versus the non-social-evaluative threat condition in response to a body image threat (see Table 2 and Figure 2). Pre-threat (S2) levels of cortisol were used as the covariate, condition was used as the independent variable and the two post-threat cortisol measures (S3 and S4) were used as

the dependent variables. Results indicated there was a significant difference between pre-threat cortisol (S2) and the first post-threat cortisol level (S3; $F_{(1,63)} = 7.74, p = .007, \eta_p^2 = .11$) in response to the social-evaluative threat. The results of the ANCOVA for the final cortisol measure (S4) indicated there was also a significant difference between pre-threat cortisol (S2) and post-threat 2 cortisol (S4; $F_{(1,63)} = 7.42, p = .008, \eta_p^2 = .11$) with cortisol levels higher in the social-evaluative threat condition after the social-evaluative body image threat (see Table 2). As a result, those participants who were randomly assigned to the social-evaluative threat condition had higher levels of cortisol after undergoing the threat compared to those in the non-social-evaluative threat condition when pre-threat levels of cortisol were controlled for, and significantly higher levels were measured at the final sample.

Figure 2

Cortisol means at each time point by condition

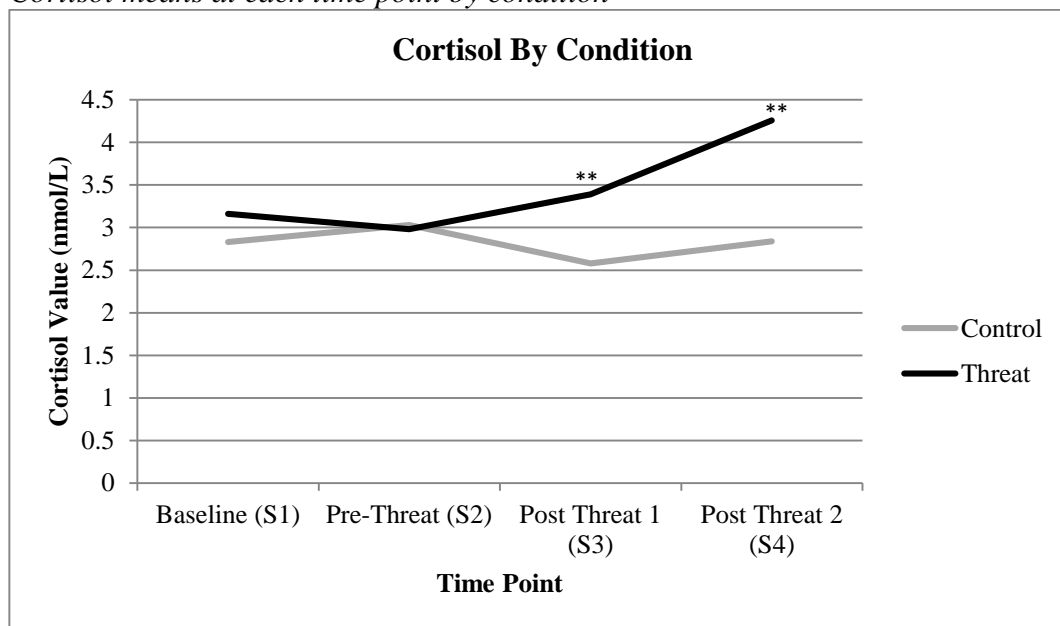


Figure 1. Mean cortisol levels by condition for each time point (see Table 2 notes for time approximations). Cortisol was measured in ng/mL.

* $p < .05$. ** $p < .01$

CHAPTER 5: DISCUSSION

The aim of the present study was to examine the psychological and physiological responses to a social-evaluative body image threat in university men. Specifically, measures of shame, body dissatisfaction, and SPA (psychological measures) and cortisol (physiological measure) were assessed pre- and post-threat. The results of the study supported the hypothesized outcomes. Shame, SPA and body dissatisfaction were all found to be higher in the social-evaluative threat condition versus the non-social-evaluative threat condition post-threat. In addition, consistent with hypotheses, cortisol levels were found to be higher in the social-evaluative threat condition versus the non-social-evaluative threat condition post-threat.

5.1. Descriptive Data

Overall, the sample represented a standard college sample of men with respect to demographic variables. BMI was within a healthy range (24.90 for participants in the non-social-evaluative threat condition and 23.55 for those in the social-evaluative threat condition; Health Canada, 2011). In general the participants in the present study were physically active, meeting the recommended amount of physical activity on average (> 600 MET-min/week; Ekelund et al., 2006). Although there was a significant difference in moderate/vigorous physical activity between conditions both the social-evaluative and non-social-evaluative threat groups reported participating in regular physical activity and many participants (from both groups) achieved at least 1200 MET-min/week, the level which, according to World Health Organization, is needed to attain health benefits (Pastuszak, Lisowski, Lewandowska, & Busko, 2014). Thus, in both conditions men were considered active. Further, there were no significant differences in any other

demographic measures between participants in the two conditions. Participants' drives for muscularity scores were typical for university-aged men as similar scores were reported by McCreary et al. (2004) and Duggan and McCreary (2004).

5.2. Self-conscious emotions and non-self-conscious emotions

5.2.1. Self-conscious emotions. Differences in SPA and shame (both self-conscious emotions) post-threat between conditions after controlling for pre-threat scores on SPA and shame respectively were investigated. The results supported the hypothesis, with significantly higher self-conscious emotions (SPA and shame) in the social-evaluative threat condition compared to the non-social-evaluative threat condition.

These are consistent with previous research in female samples. In women, self-conscious emotions have been found to increase in response to social-evaluative body image threats (Bailey et al., 2014; Cloudt et al., 2014; Lamarche et al., 2014; Gammage et al., 2004; Martin Ginis et al., 2012). For example, a study conducted by Lamarche et al. (2014) had women randomized into either a control or social-evaluative body image threat condition. Participants in the threat condition were led to believe they would undergo a three-site skinfold assessment while wearing spandex shorts and a jog bra in the presence of two researchers. In the control condition participants sat quietly for 10 minutes. Results of this study showed shame and SPA were significantly different between the threat and control condition, with shame and SPA higher in the social-evaluative threat condition.

When examining the magnitude of change for shame and SPA, previous research has found greater increases in these measures post-threat in social-evaluative threat conditions (Cloudt et al., 2014; Lamarche et al., 2012; Martin Ginis et al., 2012). One

possible explanation as to why shame and SPA did not have the magnitude of change that has been found in previous research is that the current study was done in men whereas previous research has focused on women and women have generally been found to have higher SPA and shame (Brunet et al., 2010; Kruisselbrink et al., 2004; McKinley, 1998).

5.2.1.1. Shame. Shame is the key self-conscious emotion that occurs in response to an event where one's social worth or social status is threatened according to SSPT (Dickerson & Kemeny, 2004; Gruenewald et al., 2004). Shame generally occurs in a public (versus private) situation although it can also occur in a private setting (Dickerson & Kemeny, 2004). A key distinguishing factor separating shame from other self-conscious emotions (e.g., embarrassment) is that with shame, the self, rather than a situation, event, or behaviour, is the object of the negative evaluation (e.g., I am a bad person; Lewis, 1971; Niedenthal et al., 1994). Shame is associated with increases in cortisol which in turn may lead to other physiological responses including increased heart rate, blushing, wanting to hide and feeling physically smaller (Dickerson & Kemeny, 2004; Tangney et al., 1996).

These physiological responses are consistent with the results of the current study. Although not explicitly measured, many participants in the social-evaluative threat condition experienced a variety of physiological responses including blushing, sweating and skin that was warm to the touch. These physiological responses have been documented in research as common responses associated with feelings of shame and social evaluation and are consistent with SSPT (Leary, Britt, Cutlip, & Templeton, 1992; Leary & Meadows, 1991). As humans we have a basic need for acceptance and belonging. When this need is threatened, psychological responses (particularly shame)

are elicited to signal the threat (Dickerson et al., 2008; Dickerson & Kemeny, 2004; Gruenewald et al., 2004). As a result, individuals can engage in behavioural responses designed to lessen the social-evaluative threat and reduce shame.

5.2.1.2. Social physique anxiety. SPA may be an important indicator of poor body image and self-presentational concerns as it occurs when one is worried about receiving negative evaluations about the body from others (Hart et al., 1989). Therefore, it can also be considered to be self-conscious in nature and so it is not surprising that in the current study participants who underwent a social-evaluative body image threat reported higher post-SPA scores than participants in the non-social-evaluative threat condition.

Men in the social-evaluative threat condition in the current study also exhibited physiological responses (i.e., blushing and sweating), which are consistent with the physiological responses occurring during social anxiety when individuals believe they are in danger of not meeting society's standards (Clark & Wells, 1995; Dickerson & Kemeny, 2004). In fact, blushing is a common emotional concomitant of feeling socially anxious especially during events that threaten an individual's public identity (Leary, et al., 1992). In the current study, men's bodies (appearance and strength) were the focus of potentially evaluative judgments by the confederates and researchers. Therefore, it is likely that the somatic (i.e., blushing) and behavioural (i.e., making comical remarks or making excuses for their appearance or function and wanting to hide) responses demonstrated by participants were due in part to SPA created by the social-evaluative nature of the threat.

The results of this study and previous research add to evidence that both an actual and the anticipation of a social-evaluative body image threat can elicit self-conscious emotional responses (Bailey et al., 2014; Cloudt et al., 2014; Gammage et al., 2004; Lamarche et al., 2014; Martin Ginis et al., 2012). The nature of that social-evaluative threat, it appears, needs to be specifically designed for the population being studied particularly when investigating body-related threats. In an interview study (Lamarche et al., in progress) men were asked about specific situations they would find uncomfortable and would lead them to feel anxious or ashamed of their bodies. Men reported that being in the presence of others who met the North American ideal (men or women) and when they were shirtless were factors that increased perceptions of the threat. By contrast, an interview study with women found that wearing a bathing suit, wearing unflattering clothes, during intimacy and having others present were perceived as threatening (Lamarche et al., 2012). The present study, in conjunction with previous research with women (Lamarche et al., 2012; Lamarche et al., 2014; Martin Ginis et al., 2012), provides evidence of gender differences in what constitutes a social-evaluative threat in body-related situations. By contrast, the most commonly used social-evaluative threat (i.e., TSST; Kirschbaum et al., 1993) has failed to show gender differences.

5.2.2. Non-self-conscious emotions. The second measure of the first research objective examined changes in body dissatisfaction in the social-evaluative and non-social-evaluative threat conditions following the threat. The results were consistent with the hypothesis. We hypothesized that body dissatisfaction would be higher in the social-evaluative threat condition compared to the non-social-evaluative threat condition. Body dissatisfaction was found to be higher in participants in the social-evaluative threat

condition post-threat compared to participants in the non-social-evaluative threat condition.

This finding is inconsistent with SSPT, which suggests that non-self-conscious emotional responses (e.g., anger, sadness) should generally not be elicited during a social-evaluative threat (Dickerson & Kemeny, 2004). The results of the current study may help us to further understand the true nature of body image responses. Specifically, greater body dissatisfaction in the social-evaluative threat condition compared to the non-social-evaluative threat condition may indicate that all body image responses are at least somewhat self-conscious in nature (i.e., body dissatisfaction is a really self-conscious emotion). Self-conscious emotions have been defined as a special class of emotions that involve self-relevant thoughts, feelings, behaviours and/or intentions and that involve self-evaluation (Campos, 1995; Dickerson, Gruenewald et al., 2004; Fischer & Tangney, 1995; Tangney, 1999). It may be that all body image threats result in similar responses as they may encourage comparison to the ideal occurs (i.e., body dissatisfaction may occur when perceptions of self do not met the ideal).

The results of the current study were however partly consistent with previous literature in women. Lamarche et al. (2014) found body dissatisfaction increased in both the social-evaluative threat group as well as the control group in women in anticipation of a social-evaluative body image threat; no differences between conditions were found. Thus in both the social-evaluative and non-social-evaluative body image threat conditions body dissatisfaction increased.

When comparing the magnitude of change in body dissatisfaction in the current study to previous research results are fairly consistent (Lamarche et al., 2012). Although

women tend to be more dissatisfied with their bodies compared to men (Cash & Pruzinsky, 2002) similar changes in magnitude may further support the increasing body image concerns in men (Daniel & Bridges, 2013; Lamarche et al., in progress; McCreary & Sasse, 2000).

5.4. Research Question #2: Cortisol

Differences in cortisol between participants in the social-evaluative and non-social-evaluative threat conditions pre- to post-social-evaluative threat were also examined. The results for this research question supported the hypothesized outcome that cortisol levels would be higher in the social-evaluative threat condition post-threat compared to the non-social-evaluative threat condition. Further, the elevated cortisol was present at both post-threat time points (i.e., approximately 15-20 minutes post-threat; and 30-32 minutes post-threat). This finding is consistent with research using a performance-based social-evaluative threat (Kirschbaum, Wolf, May, Wippich, & Hellhammer, 1996). Meta-analytic findings have shown cortisol peaks 21-40 minutes following a social-evaluative threat and remains elevated for up to 60 minutes post-social-evaluative threat (Dickerson & Kemeny, 2004). In the current study, consistent with other research, cortisol levels were higher even 10 minutes post-threat (Dickerson & Kemeny, 2004) and these levels remained higher 30 minutes after the threat was removed. This finding is important to highlight as it is normal for cortisol levels to increase in response to a stressor. However, when levels remain elevated once the threat is removed, as they did in the current study, negative health implications of excess cortisol may occur (Gruenwald et al., 2004; Dickerson & Kemeny, 2004; Rohleder et al., 2007).

The results of the current study were consistent with some previous research. Martin Ginis et al. (2012) found cortisol levels in their first experiment were higher post-manipulation compared to cortisol levels in the control condition, after controlling for baseline cortisol. However, it is unclear if the difference in cortisol between conditions in their study was due to decreases in the levels of cortisol in participants in the control conditions or increases in participants in the threat or a combination of both. In the present study, there was a significant increase in cortisol consistent with previous research examining a performance based social-evaluative threat (Kirschbaum et al., 1993; Rohleder et al., 2007). However, the magnitude of the change in cortisol in the present study was not as large as that in previous research. For example, Kirschbaum et al. (1993), Rohleder et al. (2007), and Wolf, Schommer, Hellhammer, McEwen and Kirschbaum (2001) showed cortisol levels almost doubled compared to levels prior to the onset of the threat/competition. This difference however, could be due in part to the nature of the threat (performance-based versus body image) and the fact Kirschbaum et al. (1993) and Rohleder et al. (2007) looked at both men and women together. Previous research indicates women may have greater daily fluctuations in cortisol compared to men (Kunz-Ebrechi, Kirschbaum, Marmot, & Steptoe, 2004; Ljubijankic et al., 2008). In comparison to the Martin Ginis et al. (2012) study it is likely that the difference in cortisol between groups in their study were due to decreasing cortisol in the control group rather than increasing levels in the threat condition. By contrast, results from the current study were due to increasing levels of cortisol following the social-evaluative threat.

The current study is also consistent with studies examining cortisol differences during a performance based social-evaluative threat (Gruenewald et al., 2004; Kemeny et

al., 2004; Rohleder et al., 2007). For example, Rohleder et al. (2007) examined cortisol levels of ballroom dancers. They found that on competition days, where there was a potential for negative evaluation and loss of social status, dancers had significantly higher cortisol levels compared to control days where no evaluation occurred. Similarly, studies using the TSST as the social-evaluative threat have consistently shown cortisol to be higher in a social-evaluative threat compared to a non-social-evaluative threat group (Kirschbaum et al., 1996; Het, Rohleder, Schoofs, Kirschbaum, & Wolf, 2009).

Although Lamarche et al. (2014) found no group differences in cortisol between conditions in their study, participants did not undergo an actual social-evaluative threat; rather, it was anticipated. The authors speculated that exposure to an actual threat is required for cortisol increases to occur. Similar results (i.e., no changes to cortisol) have been showed using the TSST in virtual reality settings (Jonsson et al., 2010; Kelly, Matheson, Martinez, Merali, Anisman, 2007), when thinking about a social-evaluative threat (Dickerson, Kemeny et al., 2004), in the mere presence of others (Dickerson et al., 2008), and finally when performing with an expert panel outside the room (Wadiwalla et al., 2010). Thus, together this body of literature suggest that for significant increases in cortisol to occur an actual social-evaluative threat must occur.

5.5. Additional Findings

Although cortisol was the only physiological outcome assessed in response to the social-evaluative threat, there were other physiological responses observed by researchers throughout data collection, including participants sweating, becoming flush in the face, and feeling warm to the touch in the social-evaluative threat condition, all of which are responses associated with shame (Tangney et al., 1996). By contrast, these shame

responses were not observed in the non-social-evaluative threat group. A number of participants resorted to humor to deal with the threat while in the social-evaluative threat condition including comments like “I really need to get back into the gym (*laughs*)” and “sorry I can’t take off this shirt” – referring to chest hair. Humor has been observed by other researchers when examining physique anxiety (Kowalski, Mack, Crocker, Niefer, & Fleming, 2006). One participant wiped his chest and armpits with his t-shirt before beginning measurements and many other participants remained quiet during the threat and sat with their arms close to their bodies (crossed) as if attempting to appear smaller, which has been found to be associated with feelings of shame (Tangney et al., 1996). A common coping strategy found in previous research has indicated that during a social-evaluative threat, men and women tend to cope by appearing physically weak or smaller, and wanting to hide (Lamarche et al., in progress; Tangney et al., 1996). The same responses were not observed in men in the non-social-evaluative threat condition and when participants in this condition were debriefed about the true purpose of the study and what the threat condition entailed a common response was “I’m glad I wasn’t in that group”.

5.6. Limitations

Although this study contributes to the literature regarding the specific psychobiological responses to a social-evaluative threat in university men as well as the body image literature, there are several limitations that should be acknowledged. The small variation in participant demographics was a limitation in the current study. Our sample consisted of college-aged men, with the majority enrolled in a physical education or kinesiology degree programs at Brock University and thus our results can be

generalized only to this group. The majority of the men in our sample were also a normal, healthy weight ($BMI < 25$), as overweight or underweight men may not have felt comfortable volunteering for this study due to feeling embarrassed or uncomfortable in putting their bodies on display. However, the participants, although able to be classified as “fit” still experienced responses consistent with poor body image. Also with recruitment occurring on the campus of Brock University, it is likely those who volunteered for a study examining physical characteristics, self-beliefs, and cortisol responses were more comfortable with their bodies than individuals who struggle with weight (overweight and underweight). Although the true purpose of the study was concealed, Brock University’s research ethics board required that the posters placed around campus informed men the study was body-related.

During the study participants were asked to fill out a series of questionnaires, one package pre- social-evaluative threat and the same one post-threat. Participants were asked to fill out the questionnaire indicating how they felt at that moment in time. Therefore in both conditions social desirability may be limitation. However this explanation is unlikely as all psychological responses were found to be significantly different between conditions and consistent with the cortisol responses, which are not subject to social desirability biases. Participants in both the social-evaluative threat and non-social-evaluative threat conditions may have answered based on how they believed the researchers wanted them to answer. Previous to the beginning of the study participants were asked to answer questions as honestly as possible, however, it is unknown if the answers provided were truthful.

It is also possible that participants knew the true purpose of the study or had previous knowledge of the study prior to participating. During debriefing participants in both conditions were informed that data collection was still occurring and that it was important to not reveal or discuss the true purpose of the study to anyone but it is possible that the true purpose could have been revealed. It is also possible that participants knew the confederates and/or research assistants of the study. It may have allowed participants to feel less uncomfortable during the study (especially in the social-evaluative threat condition; Carron & Prapavessis, 1997). Similarly, it is also possible that participants did not believe the manipulations used in the current study. Because specific elements were required to create a strong social-evaluative threat (e.g., a video tape, normative feedback, etc.) some participants may have felt everything involved in the current study was too “staged” or unrealistic. However, given the significant cortisol response, it is unlikely these limitations could fully explain the findings.

Finally, participants were asked to follow specific directions on the day of study participation. Although many participants indicated they followed instructions (i.e., they did not eat, drink, workout or have anything stressful happen to them) there is no way to know if participants were being honest throughout the study. However, given that baseline cortisol levels were consistent with previous studies (Kirschbaum et al., 1993; Rohelder et al. 2007; Wolf et al., 2001), it is likely that these directions were followed correctly as baseline levels of cortisol for both conditions were consistent with previous research with healthy adult men. For example, cortisol sampled in the late afternoon (4-5pm) has been reported in the literature to be 11.5ng/mL ($SD = 6.9$; Ljubijankic et al., 2008). Although this value is slighter higher than baseline levels in the current study the

current study, the current study measured salivary cortisol between 3-7pm. This greater range of times may account for the slightly different levels of cortisol between the two studies. However, overall levels of cortisol were typical for men.

5.7. Implications

This study has implications for research and to our understanding of both SSPT and body image.

5.7.1. Research. The present study makes a significant contribution to the literature by providing the first evidence of a standardized social-evaluative body image threat that can elicit psychobiological responses consistent with SSPT in college men. The threat in the current study maximized elements proposed to increase the social-evaluative nature of the threat according to SSPT and described by men as increasing a threatening situation (Dickerson & Kemeny, 2004; Lamarche et al., in progress). For example, specific factors known to increase the social-evaluative nature of a threat (Dickerson & Kemeny, 2004) were used to add to the social-evaluative nature of the threat and these included: a videotape (permanent recording), focusing on characteristics of importance (leanness, muscularity and strength), and finally evaluation/comparison to social norms (male confederate matching North American ideal). These factors were used in combination with elements described by men to specifically elicit body-related social-evaluation during an interview study (Lamarche et al., in progress). These factors included: body on display (e.g., no shirt), the presence of an attractive female and also in the presence of someone more fit/more strong (male ideal).

It should be noted that, in women, conditions that have been found to make social situations more uncomfortable while following the same general principles (i.e.,

evaluation, revealing ones' body, a characteristic of importance) are operationalized very differently (Lamarche et al., 2012; Martin Ginis et al., 2012). For example women tend to focus on thinness with low body weight and men are focused on muscularity. Therefore, the current study adds to the literature by providing understanding that the unique nature of the social-evaluative threat depends on the population being studied; ultimately men require a different threat than women to elicit psychobiological responses.

5.7.2. Body image. Although men have been conditioned not to care or at least not to talk about their appearance (Duggan & McCreary, 2004), the results of this study and others support the notion men may suffer in silence about body image issues or concerns and may have just as many concerns as women (Duggan & McCreary, 2004; Lamarche et al., in progress; Pope et al., 2000). The psychological and physiological responses found in the current study (i.e., shame, SPA and cortisol) are consistent with responses to a social-evaluative body image threat in a laboratory setting in women (Lamarche et al., 2012, Lamarche et al., 2014; Martin Ginis et al., 2012). These psychological and physiological responses have the potential to lead to many negative health implications. Having a poor body image has been associated with depression, anxiety, feeling inferior, and may lead to withdrawal, isolation and harmful behaviours (i.e., excessive exercise, disordered eating and eating disorders; Chittester & Hausenblas, 2009; Lamb, 1984; Muth & Cash, 1997; Walker et al., 1998).

The current study also provides further evidence that when examining body image, physiological, as well as psychological, outcomes should be considered. Sabiston, Castonguay, Barnett, O'Loughlin, and Lambert (2009) were the first to examine a link between body image and indicators of immunity. They found that adverse biological

markers that pose a cardiometabolic risk were associated with negative body image in adolescents. The current study provides additional evidence that situations of negative body image have corresponding negative physiological responses. These negative physiological outcomes, specifically cortisol, has been linked to suppressed immunity, hypertension, insulin resistance, glucose intolerance, obesity and other health concerns (Dickerson & Kemeny, 2004; Rohleder et al., 2008; Walker et al., 1998), independently of negative body image outcomes.

An important finding of the current study was men in the threat condition were found to have increased body dissatisfaction after undergoing the social-evaluative body-image threat compared to participants in the non-social-evaluative threat condition. Previous researchers have indicated that women are generally more dissatisfied with their bodies than men (Cash & Pruzinsky, 2002); however, findings from the current study support the notion men may also be dissatisfied with their bodies, similar to women, when they feel they are being evaluated based on their looks, in particularly their muscularity. For men, negative body image revolves around the male ideal with a focus on lean muscle mass and strength (rather than thinness). Researchers have identified many negative health implications associated with wanting to change one's body (i.e., become more muscular) including SPA, poorer self-efficacy, a heavy focus on physical appearance and bodily fitness, depression, and fear of not being accepted in society (Baumeister & Tice, 1990; Cash et al., 2005; Cash & Pruzinsky, 2002; Ricciardelli & McCabe, 2011). Findings from this study may help us to better understand the psychobiological responses that occur in men after undergoing a social evaluative threat

and therefore, allowing the development of coping strategies for men in uncomfortable body image situations.

Many men in the current study responded to the social-evaluative threat in different ways, each consistent with results found in a qualitative study done in men by Lamarche et al. (in progress). In the current study, men in the social-evaluative threat condition coped by joking about themselves, in particular about their bodies, and aspects they felt were socially undesirable (e.g., chest hair or small biceps). Participants also slouched into their chairs (trying to hide or appear physically smaller, consistent with behavioural responses indicating shame; Tangney et al., 1996) and withdrew from what was happening in the study (e.g., when the male confederate was having his anthropometric measures done the other participant was likely to stare at the ground or the wall). These coping strategies are all consistent with Lamarche et al. (in progress) where men specifically mentioned in an uncomfortable body-related situation they would stay quiet, feel like they wanted to disappear, and avoid the situation. Many men in this qualitative study also mentioned they would workout to appear “bigger”, consistent with the current study where participants in the social-evaluative threat condition spoke of “getting back into shape” or “getting back into a gym routine” during the anthropometric measures.

It is also important that researchers and society are made aware of the body image concerns felt by men in society today. In the current study each psychological (i.e., SPA, shame and body dissatisfaction) as well as physiological (i.e., cortisol) responses were significantly different between conditions post-threat. These results provide us with evidence that men are concerned with their appearance, although the nature of the

concern is different than women. They are focused on muscularity and feel uncomfortable when they believe their bodies are on display in comparison to an ideal male. Further research needs to be done on male body image and the many concerns they have regarding their bodies. It is important to gain more knowledge in the area to develop useful coping strategies and interventions to help men deal with their concerns before they become more damaging to their health.

5.7.3. SSPT. This study contributes to SSPT, providing evidence that not just performance based tasks (e.g., public speaking, competitive ballroom dancing) but also appearance-based situations serve as social-evaluative threats. Further, this is the first study in men where an actual body image threat was used, providing support that an actual threat may be needed, as opposed to anticipated, for cortisol responses to occur. This study extends SSPT into the domain of body image by providing a significant connection between SSPT and body image as it extends SSPT into non-performance based situations that focus on the body.

5.8. Future Directions

The current study provides strong evidence that men too struggle with body image concerns and are apprehensive about being evaluated by others. Replication is needed as this study is the first to explicitly apply SSPT to a social-evaluative body image threat in men. However, it is extremely important to expand our knowledge of male body image and deepen our understanding about the specific physiological and psychological responses that can occur in response to a social-evaluative body image threat.

Future studies should examine potential moderating effects of the psychological responses to these threats, such as appearance investment, to determine if men who place

more importance on their appearance show a greater psychobiological response. It is also important to evaluate factors that may increase or decrease the social-evaluative nature of social-evaluative situations (i.e., different settings, number of others present, different tasks) to determine if they result in the same psychobiological responses, and providing us with more knowledge of the specific situations men find uncomfortable and threatening to their social status or worth.

It would also be beneficial to determine what aspect(s) of the social-evaluative threat was/were the most threatening. The current study did not examine which aspect of the manipulation (e.g., being shirtless, being videotaped, being in the presence of an attractive female, being compared to a male ideal) made participants feel most uncomfortable, therefore, it is difficult to know if responses occurred due to one specific aspect of the threat or a combination of the different aspects included. By determining situations men find to be particularly uncomfortable, researchers can gain a better understanding of the psychobiological responses that may occur during extremely threatening body image situations and develop appropriate coping strategies.

Another avenue worth exploring would be the effect of repeated exposure to social-evaluative body-image threats in a real life situation. Little is known about the long-term effects of continually being exposed to uncomfortable body image situations and there is potential for other negative health implications (i.e., heart disease, diabetes; Dickerson & Kemeny, 2004; Walker et al., 1998) to be connected to continued exposure to a social-evaluative body-image threat.

Lastly, future studies should replicate the current study to determine if results are consistent in other age groups (i.e., youth, middle-aged and older men) and those with

different education levels (i.e., no college education and post graduate education) and those of different health status (i.e., overweight/obese, underweight, those with a debilitating disease). It is possible that a social-evaluative body image threat may impact these groups differently than college-aged men. Future studies should further explore the potentially harmful behaviours men may be engaging in to cope with the growing pressures to meet society's ideal. Dietary habits and exercise should be examined to determine if men are coping through these potentially harmful behaviours in order to meet this desired ideal.

5.9. Conclusions

In conclusion, the present study examined the psychobiological responses to a social-evaluative threat in university-aged men. Consistent with SSPT, significant differences were found post-threat between the social-evaluative threat and non-social-evaluative threat conditions, with men in the social-evaluative threat condition experiencing more body dissatisfaction, and higher SPA and shame than those in the non-social-evaluative threat condition. There were also significant differences found between conditions for cortisol, with men in the threat condition experiencing higher levels of cortisol after the social-evaluative threat compared to those in the non-social-evaluative threat condition when pre-threat levels of cortisol were controlled for. Overall, the results of this study suggest that men who undergo a social-evaluative body-image threat are at risk for experiencing negative psychological (shame, SPA, and great body dissatisfaction) and physiological (cortisol) responses.

The results of this provide us with important information regarding men's responses to a social-evaluative body image threat and provided us with evidence that

men too struggle with body image concerns that elicit significant psychobiological response when facing a social-evaluative body-image threat. Previous research has focused primarily on women; however, the results of the current study confirm the need to further explore men's body image concerns to gain a better understanding of the different psychobiological responses and negative health implications that may occur. Further, by gaining knowledge surrounding male body image concerns researchers can work to develop coping strategies for those struggling with their image encouraging them to speak out about these issues the in knowing they are not alone.

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Appendix A: Poster Advertisement

Research Participants Wanted!

An Examination of Physical Characteristics, Self-beliefs, and Cortisol Responses in College-Aged Men.

Purpose: To examine strength and anthropometric measure in relation to cortisol and body image in a laboratory setting

Who can Participate?

- Male, university students who are non-smokers and non-varsity athletes
- No history or diagnosis of a clinical eating disorder
- Not taking anti-depressants/corticosteroids

What is Required:

- One visit lasting 60 minutes
- Complete several questionnaires, assessment of strength, body composition and provide 4 samples of saliva

\$10.00 or 1 hour credit for research participation will be offered for participation

Contact the following:

Principal Investigator:
Kimberley L. Gammage,
 Associate Professor
 Department of Kinesiology
 Brock University
 905-688-5550 (x3772)
 kgammage@brocku.ca

Co-Investigator:
Larkin Lamarche, PhD
 Department of
 Kinesiology
 Brock University
 905-688-5550 (x4147)
 llamarche@brocku.ca

Principal Student Investigator:
Brianne Ozimok
 MSc Student
 Faculty of Applied Health Science
 Brock University
 bo11by@brocku.ca

This study has received ethics clearance through Brock University Research Ethics Board (file #:13-037)

Appendix B: Verbal Announcement

Verbal Announcement

Hi, my name is Brianne Ozimok and I am recruiting for a research study that examines the relationship between physical characteristics, self-beliefs and cortisol (a physiological indicator of stress) in a laboratory setting. Participation takes one visit that will last about 60 minutes of your time. You will be asked to complete several questionnaires, provide 4 samples of saliva and undergo assessments of body composition and strength. We are recruiting university men with no previous diagnosis of a clinical eating disorder, who are non-smokers, non-varsity athletes, and who are not on medication that affects cortisol secretion such as anti-depressants or corticosteroids. You will be offered \$10.00 or one hour course credit for research participation to compensate you for your time.

This study has received ethics clearance through Brock University Research Ethics Board
(file #:13-037)

Appendix C: Letter of Invitation

Letter of Invitation

September 2013

Project Title: An Examination of Physical Characteristics, Self-beliefs, and Cortisol Responses in College-Aged Men.

Principal Investigator: Dr. Kimberley L. Gammage, Associate Professor, Department of Kinesiology, Brock University

Principal Student Investigator: Brianne Ozimok, MSc Student, Faculty of Applied Health Sciences, Brock University

Co-Investigator: Larkin Lamarche, PDF, Department of Kinesiology

I, Kimberley Gammage, Associate Professor, from the Department of Kinesiology, Brock University invite you to participate in a research project entitled, *An examination of physical characteristics, self-beliefs, and cortisol in university men.*

The purpose of this study is to explore the relationship between beliefs about the self, physical characteristics (i.e., height, weight, percent body fat, arm, chest and waist circumference, and strength), and cortisol levels in college men.

Participation will take approximately 60 minutes. You will be asked to fill out several questionnaires at different time points. As well you will be asked to provide 4 saliva samples throughout the study. We will also take general physical measures of body composition and strength. We will offer \$10.00 or course credit to compensate you for your time.

Due to the nature of some of the questions asked in the questionnaires and the study measures you may experience some discomfort. In the event of any discomfort, contact Dr. Gammage or student health services (905-688-5550 ext. 3243, <http://brocku.ca/healthservices>). In addition, contact information for the Niagara Distress Center (905-688-3711, www.distresscentreniagara.com/) and www.211Niagara.ca is provided. Additional information can be found at www.nedic.ca and www.bodysense.ca. It is important to remember that variability in body shape and size is normal within the population; no two individuals are created equal and all different body sizes and shapes are normal.

Your participation will help examine how self-beliefs, physical characteristics and cortisol are related in college men. You can receive any of your results from the anthropometric measures and/or strength tests if you wish.

If you have any pertinent questions about your rights as a research participant, please contact the Brock University Research Ethics Officer (905-688-5550 ext. 3035, reb@brocku.ca).

Appendix D: Ethics Clearance



Brock University
Research Ethics Office
Tel: 905-688-5550 ext. 3035
Email: reb@brocku.ca

Bioscience Research Ethics Board

Certificate of Ethics Clearance for Human Participant Research

DATE: 9/12/2013

PRINCIPAL INVESTIGATOR: GAMMAGE, Kimberley - Kinesiology

FILE: 13-037 - GAMMAGE

TYPE: Masters Thesis/Project STUDENT: Brianne Ozimok
SUPERVISOR: Kimberley Gammage

TITLE: An Examination of Physical Characteristics, Self-Beliefs, and Cortisol in University Men

ETHICS CLEARANCE GRANTED

Type of Clearance: NEW

Expiry Date: 9/30/2014

The Brock University Bioscience Research Ethics Board has reviewed the above named research proposal and considers the procedures, as described by the applicant, to conform to the University's ethical standards and the Tri-Council Policy Statement. Clearance granted from 9/12/2013 to 9/30/2014.

The Tri-Council Policy Statement requires that ongoing research be monitored by, at a minimum, an annual report. Should your project extend beyond the expiry date, you are required to submit a Renewal form before 9/30/2014. Continued clearance is contingent on timely submission of reports.

To comply with the Tri-Council Policy Statement, you must also submit a final report upon completion of your project. All report forms can be found on the Research Ethics web page at <http://www.brocku.ca/research/policies-and-forms/research-forms>.

In addition, throughout your research, you must report promptly to the REB:

- a) Changes increasing the risk to the participant(s) and/or affecting significantly the conduct of the study;
- b) All adverse and/or unanticipated experiences or events that may have real or potential unfavourable implications for participants;
- c) New information that may adversely affect the safety of the participants or the conduct of the study;
- d) Any changes in your source of funding or new funding to a previously unfunded project.

We wish you success with your research.

Approved:

Brian Roy, Chair
Bioscience Research Ethics Board

Note: Brock University is accountable for the research carried out in its own jurisdiction or under its auspices and may refuse certain research even though the REB has found it ethically acceptable.

If research participants are in the care of a health facility, at a school, or other institution or community organization, it is the responsibility of the Principal Investigator to ensure that the ethical guidelines and clearance of those facilities or institutions are obtained and filed with the REB prior to the initiation of research at that site.

Appendix E: Informed Consent

Informed Consent

Date: September 2013

Project Title: An Examination of Physical Characteristics, Self-beliefs, and Cortisol Responses in College-Aged Men.

Principal Investigator:

Kimberley L. Gammage,
Associate Professor
Department of Kinesiology
Brock University
905-688-5550 (x3772)
kgammage@brocku.ca

Co-Investigator:

Larkin Lamarche, PhD
Department of
Kinesiology
Brock University
905-688-5550 (x4147)
llamarche@brocku.ca

Principal Student

Investigator:
Brienne Ozimok
Faculty of Applied Health
Science
Brock University
bo11by@brocku.ca

INVITATION

You are invited to participate in a study that examines the relationship between physical characteristics and self-beliefs and a physiological indicator of stress, cortisol, in a laboratory setting in university men.

WHAT'S INVOLVED

As a participant, you will be asked to complete a series of questionnaires several times over the course of the study. You will also be asked to take four samples of your own saliva in the test tubes provided. Your saliva will only be analyzed for cortisol. Participation will take approximately 60 minutes of your time and is done in a private laboratory setting. We will offer \$10.00 or one hour course credit for research participation to you for completing the study to compensate you for your time.

POTENTIAL BENEFITS AND RISKS

Your participation will help examine the relationship between physical characteristic and self-beliefs and a physiological indicator of stress (cortisol) in university men. You may experience some discomfort due to the nature of the questions being asked; in this event, contact information for Dr. Gammage (see above), and student health services is provided (905-688-5550 ext.3243, <http://www.brocku.ca/healthservices>). Information regarding body image concerns can be found at the following official websites: www.nedic.ca and www.bodysense.ca. Please remember that there is normal variety in body sizes and shapes within the population, and all different body sizes and shapes are normal. No known or anticipated physical risks are related to participation in this study. You may receive a copy of your results from the body composition measures and/or strength test if you wish.

CONFIDENTIALITY/ANONYMITY

The data in this study is anonymous as the information provided cannot be matched to individual participants. Informed consent will be kept separate from data collected. Any information that arises from participants will be treated with confidentiality. Your name will not be included or, in any other way, associated with the data collected in the study. Please do not place your name or any identifying information on the questionnaires. Data collected during this study will be stored in a locked filing cabinet of a research laboratory of Dr. Gammage at Brock University and will be destroyed 5 years following the completion of the study. Access to this data will be restricted to the investigators and their research team.

VOLUNTARY PARTICIPATION

Participation in this study is voluntary. If you wish, you may decline to answer any questions or participate in any component of the study. After completing participation, it will not be possible to withdraw, as your data will not be identifiable.

PUBLICATION OF RESULTS

Results of this study may be published in professional journals and presented at conferences. Feedback about this study will be available. At your request you may receive a summary of study results by completing the request for feedback from provided, or by contacting the principal student investigator or faculty supervisor by e-mail.

CONTACT INFORMATION AND ETHICS CLEARANCE

If you have any questions about this study or require further information, please contact the Investigators using the contact information provided above. This study has been reviewed and received ethics clearance through the Brock University Research Ethics Boards (file #13-037). If you have any comments or concerns about your rights as a research participant, please contact the Research Ethics Office at 905-688-5550 ext. 3035, reb@brocku.ca.

Thank you for your assistance in this project. Please keep a copy of this form for your records.

CONSENT FORM

I agree to participate in this study described above. I have made this decision based on the information I have read in the Consent Letter. I have had the opportunity to receive any additional details I wanted about the study and understand that I may ask questions in the future. I understand that I may withdraw this consent at any time.

Name: _____ (please print) Signature: _____
 Date: _____

Appendix F: Questionnaires

Demographic Sheet

Please complete the following information:

Age: _____

Major: _____

Ethnicity: _____

Sexual Orientation: _____

Did anything stressful happen to you earlier today or on your way here? Yes___ No ___

If **yes** please indicate what happened?

What time did you wake up this morning? _____

Have you ever thought you have had a clinical eating disorder? _____

Have you ever been diagnosed with a clinical eating disorder? _____

Do you smoke? _____

Are you a varsity athlete? _____

Are you on corticosteroids or anti-depressants? _____

If so, please list the medications _____

Did you eat anything within one hour of this appointment? _____

Did you drink anything within one hour of this appointment? _____

Did you do any physical activity within one hour of this appointment? _____

Have you had anthropometric measures taken in the past? _____

Weight training history

Do you currently weight lift? Yes___ No___

If yes, how many days/week? _____

On average, how long (minutes) does typical weight lifting session last? _____

How many years have you been weight training? _____

International Physical Activity Questionnaire (short)

The questions are about your time you spent being physically active in the last 7 days. They include questions about activities you do at work, as part of your house and yard work, to get from place to place, and in your spare time for recreation, exercise or sport.


Please answer each question even if you do not consider yourself to be an active person.

In answering the following questions,

- **Vigorous** physical activities refer to activities that take hard physical effort and make you breathe much harder than normal.
- **Moderate** physical activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal.

1a. During the last 7 days, on how many days did you do **vigorous** physical activities like heavy lifting, digging, aerobics, or fast bicycling?


Think about ONLY those physical activities that you did for at least 10 minutes at a time.

_____ days per week  1b. How much time in total did you usually spend on **one** of those days during vigorous physical activities?
_____ **hours** _____ **minutes**

OR

☐ **None**


2a. Again, think ONLY about those physical activities that you did for at least 10 minutes at a time. During the last 7 days, on how many days did you do **moderate** physical activities like carrying light loads, bicycling at a regular pace, or doubles in tennis? DO NOT include walking.

_____ days per week  2b. How much time in total did you usually spend on **one** of those days during moderate physical activities?
_____ **hours** _____ **minutes**

OR

☐ **None**

3a. During the last 7 days, on how many days did you do **walk** for at least 10 minutes at a time? This includes walking at work and at home, walking to travel from place to place, and any other walking that you did solely for recreation, sport, exercise or leisure.

_____ days per week  3b. How much time in total did you usually spend walking on **one** of those days?
_____ **hours** _____ **minutes**

OR

☐ **None**

Drive for Muscularity

Please read each item carefully then, for each one, circle the number that best applies to you.

1	2	3	4	5	6
Always	Very Often	Often	Sometimes	Rarely	Never

1. I wish that I were more muscular. 1 2 3 4 5 6
2. I lift weights to build up muscle. 1 2 3 4 5 6
3. I use protein or energy supplements. 1 2 3 4 5 6
4. I drink weight gain or protein shakes. 1 2 3 4 5 6
5. I try to consume as many calories as I can in a day. 1 2 3 4 5 6
6. I feel guilty if I miss a weight training session. 1 2 3 4 5 6
7. I think I would feel more confident if I had more muscle mass. 1 2 3 4 5 6
8. Other people think I work out with weights too often. 1 2 3 4 5 6
9. I think that I would look better if I gained 10 pounds in bulk. 1 2 3 4 5 6
10. I think about taking anabolic steroids. 1 2 3 4 5 6
11. I think that I would feel stronger if I gained a little more muscle mass. 1 2 3 4 5 6
12. I think that my weight training schedule interferes with other aspects of my life.
1 2 3 4 5 6
13. I think that my arms are not muscular enough. 1 2 3 4 5 6
14. I think that my chest is not muscular enough. 1 2 3 4 5 6
15. I think that my legs are not muscular enough. 1 2 3 4 5 6

BISS

For each of the items below, check the box beside the one statement that best describes how you feel **RIGHT NOW AT THIS VERY MOMENT**. Read the items carefully to be sure the statement you choose accurately and honestly describes how you feel right now.

1. Right now I feel...

- ☐ **Extremely dissatisfied** with my physical appearance
- ☐ **Mostly dissatisfied** with my physical appearance
- ☐ **Moderately dissatisfied** with my physical appearance
- ☐ **Slightly dissatisfied** with my physical appearance
- ☐ **Neither dissatisfied nor satisfied** with my physical appearance
- ☐ **Slightly satisfied** with my physical appearance
- ☐ **Moderately satisfied** with my physical appearance
- ☐ **Mostly satisfied** with my physical appearance
- ☐ **Extremely satisfied** with my physical appearance

2. Right now I feel...

- ☐ **Extremely satisfied** with my body size and shape
- ☐ **Mostly satisfied** with my body size and shape
- ☐ **Moderately satisfied** with my body size and shape
- ☐ **Slightly satisfied** with my body size and shape
- ☐ **Neither dissatisfied nor satisfied** with my body size and shape
- ☐ **Slightly dissatisfied** with my body size and shape
- ☐ **Moderately dissatisfied** with my body size and shape
- ☐ **Mostly dissatisfied** with my body size and shape
- ☐ **Extremely dissatisfied** with my body size and shape

3. Right now I feel...

- ☐ **Extremely satisfied** with my weight
- ☐ **Mostly satisfied** with my weight
- ☐ **Moderately satisfied** with my weight
- ☐ **Slightly satisfied** with my weight
- ☐ **Neither dissatisfied nor satisfied** with my weight
- ☐ **Slightly dissatisfied** with my weight
- ☐ **Moderately dissatisfied** with my weight
- ☐ **Mostly dissatisfied** with my weight
- ☐ **Extremely dissatisfied** with my weight

4. Right now I feel...

- ☐ **Extremely** physically **attractive**
- ☐ **Very** physically **attractive**
- ☐ **Moderately** physically **attractive**
- ☐ **Slightly** physically **attractive**
- ☐ **Neither attractive nor unattractive**
- ☐ **Slightly** physically **unattractive**
- ☐ **Moderately** physically **unattractive**
- ☐ **Very** physically **unattractive**
- ☐ **Extremely** physically **unattractive**

5. Right now I feel...

- ☐ **A great deal worse** about my looks than I usually feel
- ☐ **Much worse** about my looks than I usually feel
- ☐ **Somewhat worse** about my looks than I usually feel
- ☐ **Just slightly worse** about my looks than I usually feel
- ☐ **About the same** about my looks than I usually feel
- ☐ **Just slightly better** about my looks than I usually feel
- ☐ **Somewhat better** about my looks than I usually feel
- ☐ **Much better** about my looks than I usually feel
- ☐ **A great deal better** about my looks than I usually feel

6. Right now I feel I look...

- ☐ **A great deal better** than the average person looks
- ☐ **Much better** than the average person looks
- ☐ **Somewhat better** than the average person looks
- ☐ **Just slightly better** than the average person looks
- ☐ **About the same** as the average person looks
- ☐ **Just slightly worse** than the average person looks
- ☐ **Somewhat worse** than the average person looks
- ☐ **Much worse** than the average person looks
- ☐ **A great deal worse** about than the average person looks

WBRSS

Read each of the following statements carefully and circle the appropriate value following each statement.

- 0 = Strongly disagree**
1 = Disagree
2 = Neither agree or disagree
3 = Agree
4 = Strongly agree

	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
1. <u>Right now</u> , I feel ashamed because others can see my body.	0	1	2	3	4
2. <u>Right now</u> , the appearance of my body is embarrassing for me in front of others.	0	1	2	3	4
3. <u>Right now</u> , I would rather hide somewhere because others can see my body.	0	1	2	3	4
4. <u>Right now</u> , I would be ashamed of myself if others knew how much I really weighed.	0	1	2	3	4
5. <u>Right now</u> , I would feel embarrassed if I had to physical exert myself in front of others.	0	1	2	3	4
6. <u>Right now</u> , the size of my clothes is embarrassing for me.	0	1	2	3	4

State Social Physique Anxiety Scale

Read each of the following statements carefully and indicate the degree to which the statement is characteristic or true of you **right now**. Use the following scale. Circle the appropriate value following each statement.

- 1 = Not at all characteristic of me**
2 = Slightly characteristic of me
3 = Moderately characteristic of me
4 = Very characteristic of me
5 = Extremely characteristic of me

1. I feel uptight about my physique/figure	1	2	3	4	5
2. I am bothered by thoughts that the other people in the room are evaluating my weight or muscular development negatively	1	2	3	4	5
3. Unattractive features of my physique/figure make me nervous in this setting.	1	2	3	4	5
4. In this environment, I feel apprehensive about my physique/figure.	1	2	3	4	5
5. I am comfortable with how fit my body appears to the others.	1	2	3	4	5
6. It would make me uncomfortable to know that other people in the room were evaluating my physique/figure.	1	2	3	4	5
7. When it comes to displaying my physique/figure in this setting, I feel shy.	1	2	3	4	5
8. Sitting here, I feel nervous about the shape of my body.	1	2	3	4	5
9. I feel relaxed when it is obvious that others are looking at my physique/figure.	1	2	3	4	5

Perceived Evaluative Threat

Using the scale below, please circle the number that best corresponds to how threatening you think the situation was in terms of having your body evaluated.

0 = not at all

1

2

3

4 = extremely

Perceptions

Perceptions: Male

Male Participant

How close was the male participant to your perceptions of the muscular ideal?

0= not at all my perceptions of the muscular ideal

1

2

3

4= my exact perceptions of the muscular ideal

Male Research Assistant

How close was the male research assistant to your perceptions of the muscular ideal?

0= not at all my perceptions of the muscular ideal

1

2

3

4= my exact perceptions of the muscular ideal

Perceptions: Female

Female Research Assistant

How attractive do you perceive the female research assistant?

0= not at all attractive

1

2

3

4= very attractive

Primary Female Researcher**How attractive do you perceive the primary female researcher?**

0= not at all attractive

1

2

3

4= very attractive

Appendix G: Debriefing Script

Debriefing Script

The true purpose of this study was to examine the physiological and psychological responses to body-related situations in settings differing in the extent to which others could evaluate appearance where individuals believed others were evaluating their physique, strength and muscularity. Specifically, we were interested in whether changes in anxiety, body dissatisfaction, shame and cortisol occurred between 2 different situations. Cortisol is a stress hormone that is released during stressful situations that prepares us for the fight or flight response. Participants were randomly assigned into 1 of 2 different groups: a non-social-evaluative threat (N-SET) condition and social-evaluative threat (SET) condition. Participants underwent the same anthropometric measures (height, weight, percent body fat, arm, chest, and waist circumference) as well as hand-grip strength test in both groups. In the SET group only, these measures were taken in the presence of male and female confederates each representing an ideal. Participants were told the male was a second participant and the female was a research assistant. All measures were taken with the participants' shirts off and in the presence of a video camera. In the N-SET group, only the researcher was present, and all measures were taken with a shirt on. We used deception in the study in order to get a true response from the participants, which may not have happened if the real purpose of the study had been revealed. Although we were interested in assessing the uncomfortable feelings related to these body-related situations we want to make sure everyone knows that there is value in the varying shapes and sizes of each individual's body despite North America's focus on the muscular ideal. We know that this ideal can lead to many negative health outcomes, physically and psychologically, and is unrealistic and unattainable for the majority of the male population. As researchers we are seeking to find ways to promote healthy body image, regardless of body shape and size, like pride, satisfaction, and body-esteem, which are attainable for all men.

Because data collection is continuing, we would ask you not to tell anyone else about this study. If you wish, you may receive the results of your body composition and strength measures.

Appendix H: Re-Consent/Debriefing

Re-Consent/Debriefing Form

Project Title: An Examination of Physical Characteristics, Self-beliefs, and Cortisol Responses in College-Aged Men.

Principal Investigator: Dr. Kimberley L. Gammage, Associate Professor, Department of Kinesiology Brock University

Principal Student Investigator: Brianne Ozimok, MSc Student, Department of Kinesiology, Brock University

Co-Investigator: Larkin Lamarche, PDF, Department of Kinesiology, Brock University

During the debriefing session, I was given an explanation as to why the researchers had to disguise the true purpose of this study. The true purpose of this study was to examine physiological (i.e., cortisol) and psychological (i.e., body dissatisfaction, shame and body-related anxiety) responses to a body-related situation in which people are evaluated by others, and whether these responses differed in a situation with no social evaluation. In this study, half the participants underwent a social-evaluative body image threat (i.e., body composition tests; height, weight, percent body fat, chest and arm circumference and a strength test; hand grip, while shirtless) in a group with a male and female confederate and the principal student investigator. A video camera will be present in all SET conditions. The confederates represented both the male and female “ideal”. The male was described as another participant who underwent all testing procedures (physical and cortisol). The female confederate also met the North American ideal for women, and was described as a research assistant. In reality, both of these individuals were working with the researcher to create an environment in which multiple others could evaluate participant’s appearance. The other half of the participants underwent the same body composition and strength measures in an individual setting with shirts on with only the student investigator present. I was informed that having full knowledge of the true purpose of the study may have influenced the way in which I completed the questionnaires and responded physiologically to the body composition assessment and this would have invalidated the results. Therefore, to ensure this would not happen, some details about the true nature of this study were initially not provided (or were provided in a manner that slightly misrepresented the real purpose of the study). However, I am now informed of the true purpose of this study. In addition, I have had the opportunity to ask questions about this and to receive acceptable answers to my questions. I will also be given the opportunity to receive the results of my body composition and strength measures.

Re-Consent:

I have been asked to give permission for the researchers to use my data in their study, and agree to this request. I am aware I may contact Brock University (905-688-5550 ext. 3035 or reb@brocku.ca).

Date: _____

Participant name (please print): _____

Participant signature: _____

Appendix I: Summary of Results

Request for Summary of Results

September 2013

Project Title: An Examination of Physical Characteristics, Self-beliefs, and Cortisol Responses in College-Aged Men.

Principal Investigator: Dr. Kimberley L. Gammage, Associate Professor, Department of Kinesiology, Brock University

Principal Student Investigator: Brianne Ozimok, MSc Student, Faculty of Applied Health Science, Brock University

Co-Investigator: Larkin Lamarche, PDF, Department of Kinesiology, Brock University

If you would like to receive a copy of a summary of the results of this study by email, please complete the following information:

Name: _____

Email: _____

If you would like to receive a copy of a summary of the results of this study by mail, please complete the following information:

Name: _____

Address: _____

City: _____

Postal Code: _____

Summary of Results

Project Title: An Examination of Physical Characteristics, Self-beliefs, and Cortisol Responses in College-Aged Men.

Principal Investigator: Dr. Kimberley L. Gammage, Associate Professor, Department of Kinesiology, Brock University

Co-Investigator: Larkin Lamarche, PDF, Department of Kinesiology, Brock University

Principal Student Investigator: Brianne Ozimok, MSc Student, Faculty of Applied Health Science, Brock University

DATE

Dear Participant,

We greatly appreciated your involvement in our study on “*Physical Characteristics, Self-Beliefs and Cortisol in University Men*”. Because of your involvement in our study, we are able expand our knowledge on how university-aged men respond to a body image threat, in which there is the opportunity to be evaluated by others. We will be able to conduct future research examining the influence of the interventions designed to lower such responses in these situations. We will also be able to compare the usefulness of such interventions. This information will help researchers find efficient ways of coping in these types of situations.

We greatly appreciated your time and willingness to be a part of this study and with this in mind we would like to offer our thanks.

Our study concluded that

XX
XX
XX

These are very important findings because of

XX
XX
XX

Thank you again for your help in this study. We hope it has been an enjoyable and informative experience for you. If you have any further questions regarding the study or the results themselves please feel free to contact Dr. Kimberley Gammage (kgammage@brocku.ca) or Larkin Lamarche (llamarche@brocku.ca).

Sincerely,

Principal Investigator:
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Principal Student Investigator:
Brianne Ozimok, MSc Student
Faculty of Applied Health
Science
Brock University
bo11by@brocku.ca

This study has been reviewed and received ethics clearance through Brock University Research Ethics Board (file #13-037)